SANTRAL HAVA YOLLARI STENOZLARI YÖNETİMİ
KİME NASIL NE ZAMAN

PROF.DR.MEHMET AKİF ÖZGÜL
SBÜ BAŞAKŞEHİR ÇAM VE SAKURA ŞEHİR HASTANESİ
SBÜ YEDİKULE GÖĞÜS HASTALIKLARI SUAM

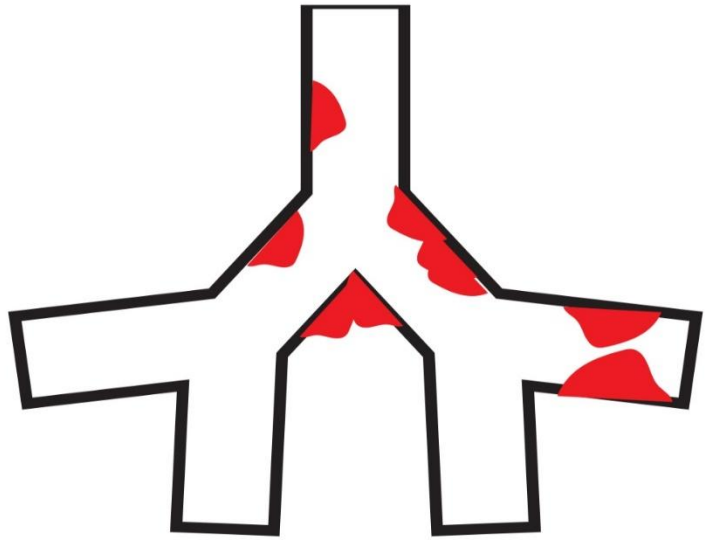
TANIM

<u>Trakea,ana bronşlar ve intermedier bronşun %50 den fazla daralması</u>

<u>≤</u> %50 SHO
Semptomlara neden olmaz

%51-70 SHO
Değişken semptomlar (ör egzersizde dispne)

<u>≥</u> 70 SHO
Hafif egzersizde yada istirahatte semptomlar



Büyük Hava Yolu Stenozu Semptomlar

Pnömoni

Öksürük

- İleri evre AC CA hastaların ≥ % 90 [1,2]

Dispne

İleri evre AC CA hastalarında % 95 [2]

Darlık nerede

Darlık derecesi ve uzunluğu

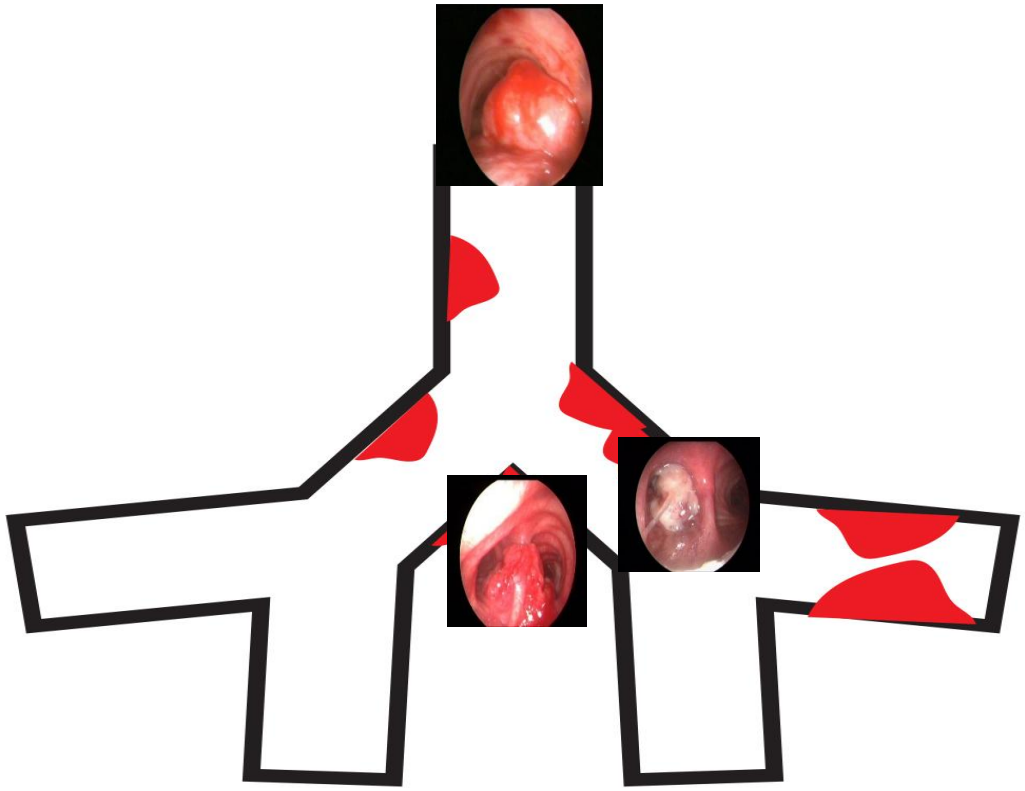
Stridor 8 mm egzersiz

5 mm istirihat

Bronkodilatöre yanıt vermeyen dispne

Hemoptizi

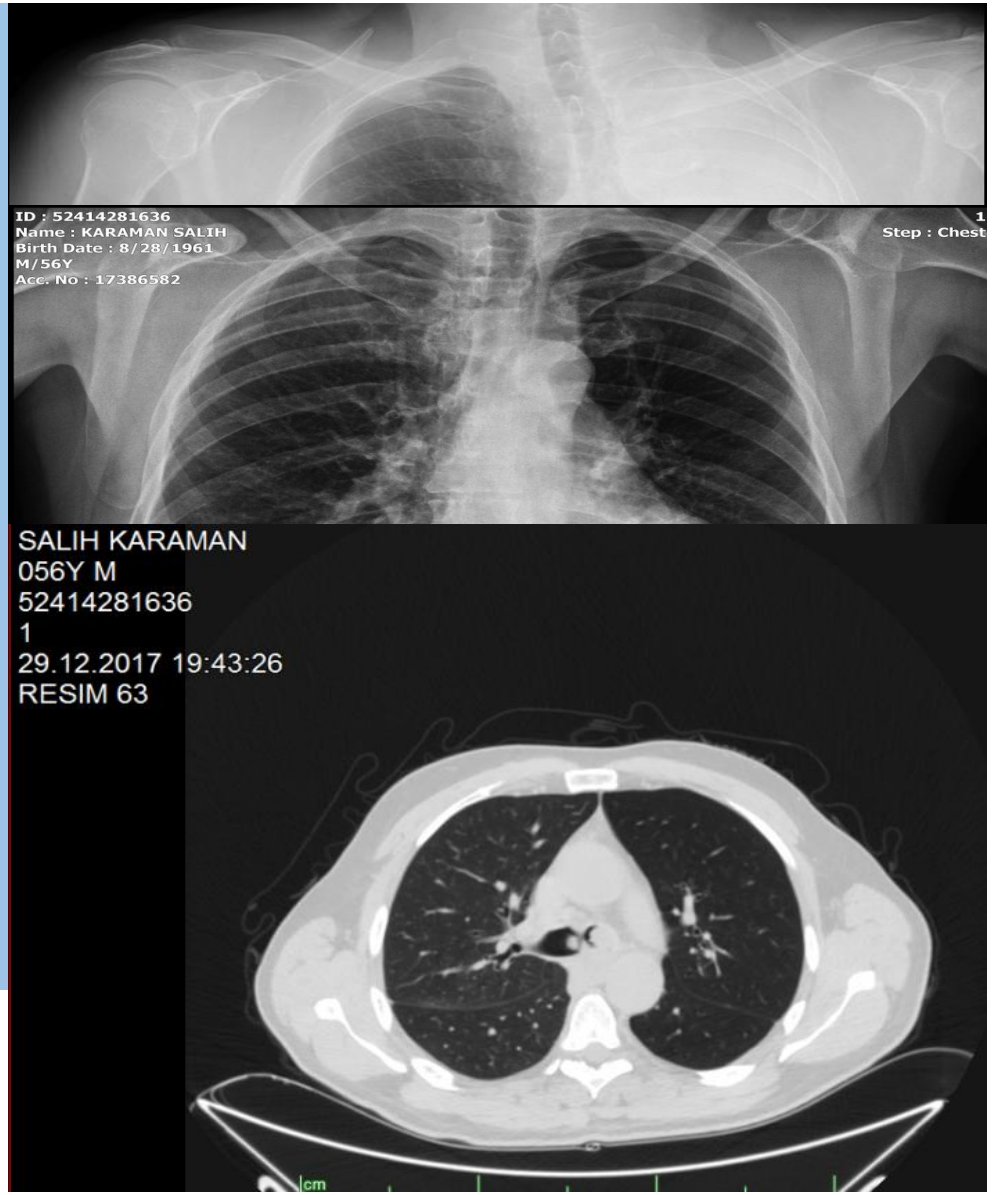
- İleri evre AC CA hastalarında % 63 [2]



1 Iyer S, et al. Lung Cancer 2013;81(2):288-93.
2 Iyer S, et al. Support Care Cancer 2014;22(1):181-7

Görüntüleme

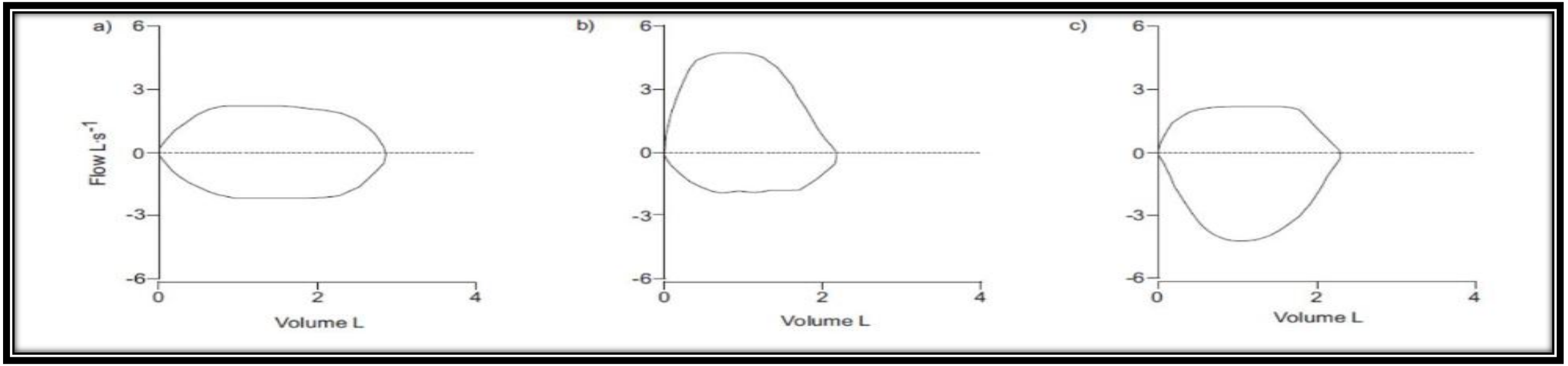
- Asemptomatik ya da subakut ise
- PA AC grafisi
  - Total atelektazi
  - Tek taraflı havalanma fazlalığı

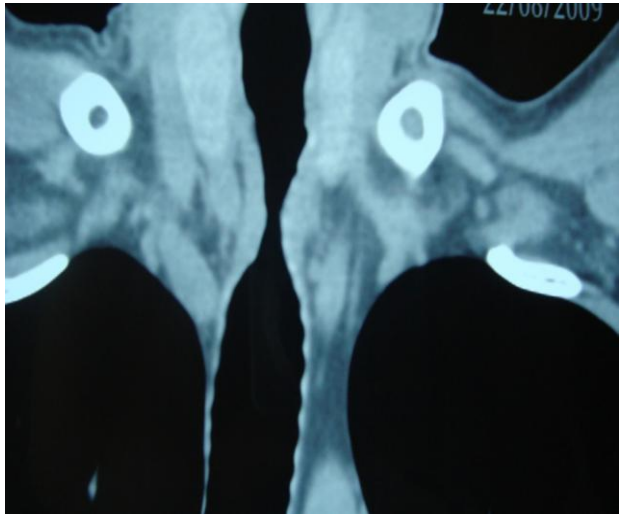


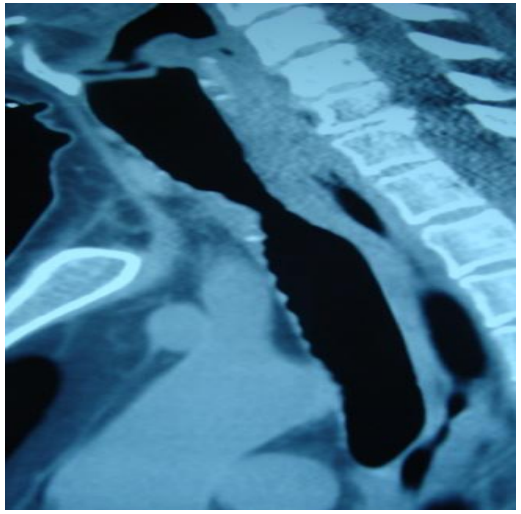
Solunum fonksiyon testi

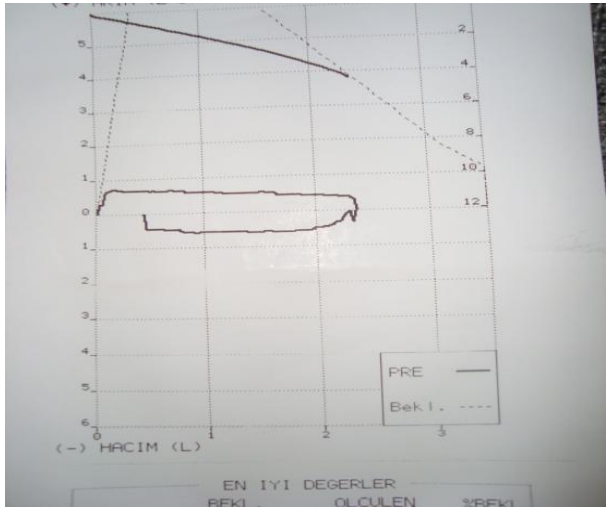
FEV1/PEF 8 ⬆

Akım volüm halkası



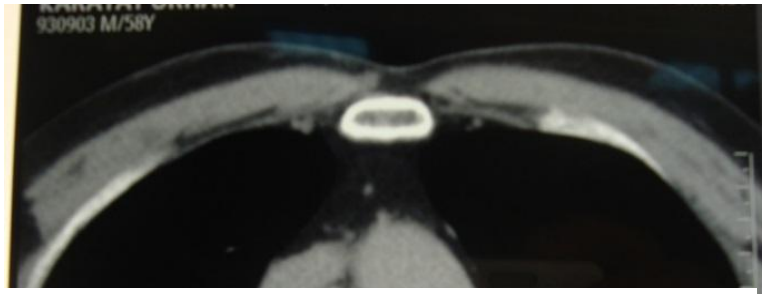




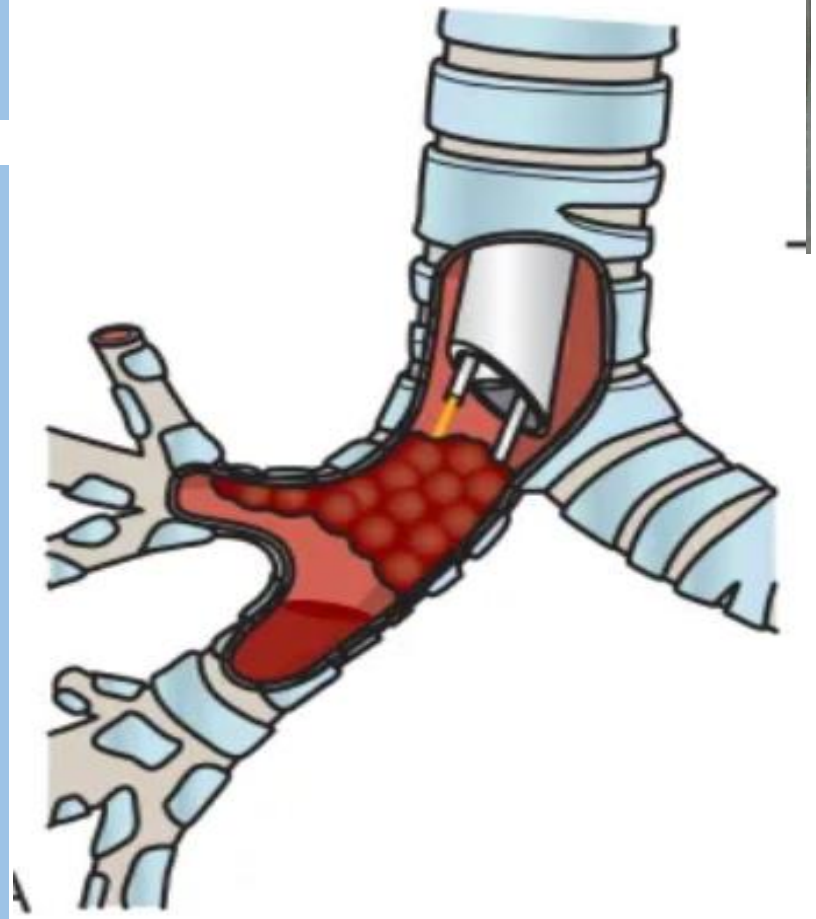


Santral Havayolu Obstrüksiyonun Tanısı

- **Bilgisayarlı Tomografi**
  - **Stenozun tipi hakkında bilgi verir**
  - **Parankimal ve vasküler yapıları gösterir**
  - **Tedavi planlaması**

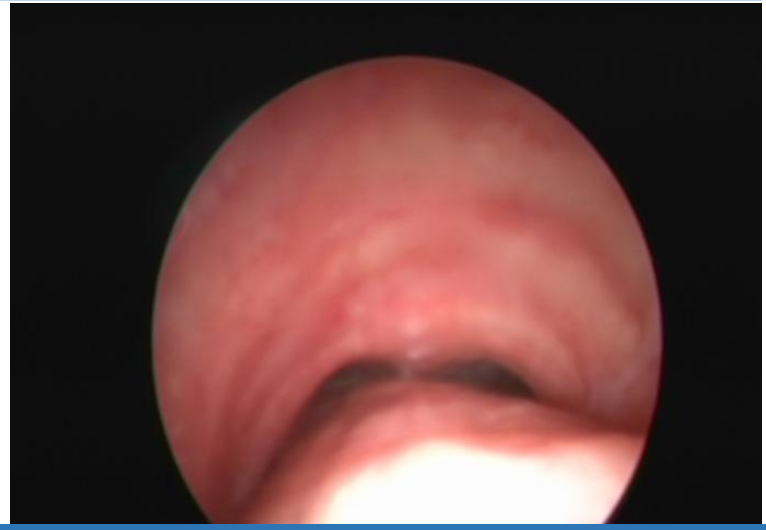


- **2 boyutlu BT**
- **Aksial koranal sagittal**
- **3 Boyutlu BT**
- **Sanal bronkoskopi**
  (İnternal eksternal görüntüleme)



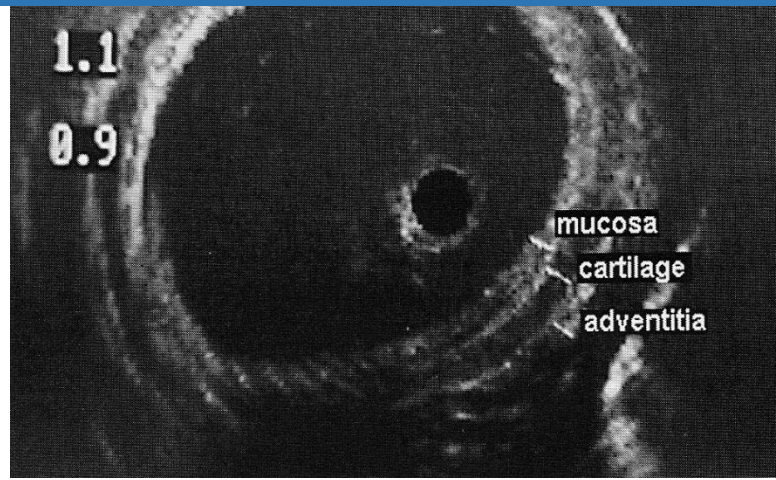
Santral Havayolu Obstrüksiyonun Tanısı

- **Bronkoskopi**
  - **Havayolu mukozası ve stenoz natürü direkt gözlenebilir**
  - **Yoğun bakım hastalarında yapılabilir.**



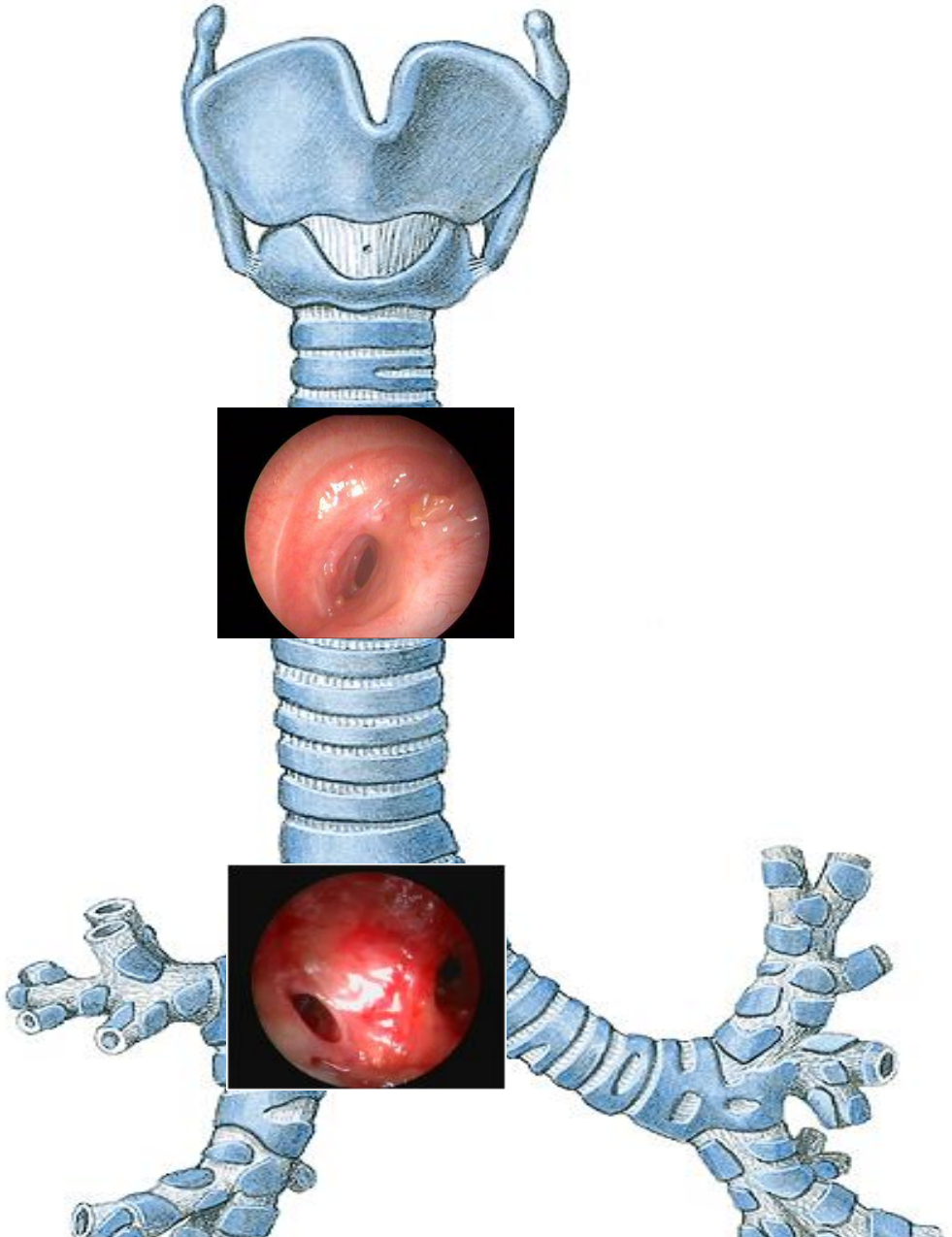
- **ASFİKSİ=ENTÜBASYON ve RİJİT BRONKOSKOPİ**

(Trakeal invazyon ve vasküler tutulum)



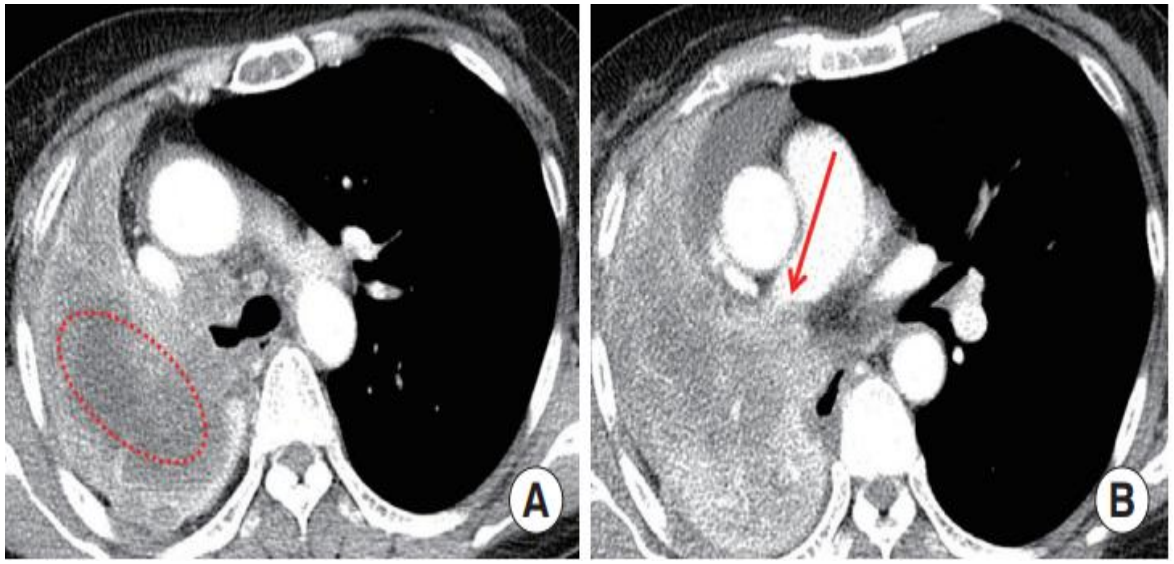
Stenozlarda Tedaviyi Etkileyen Faktörler

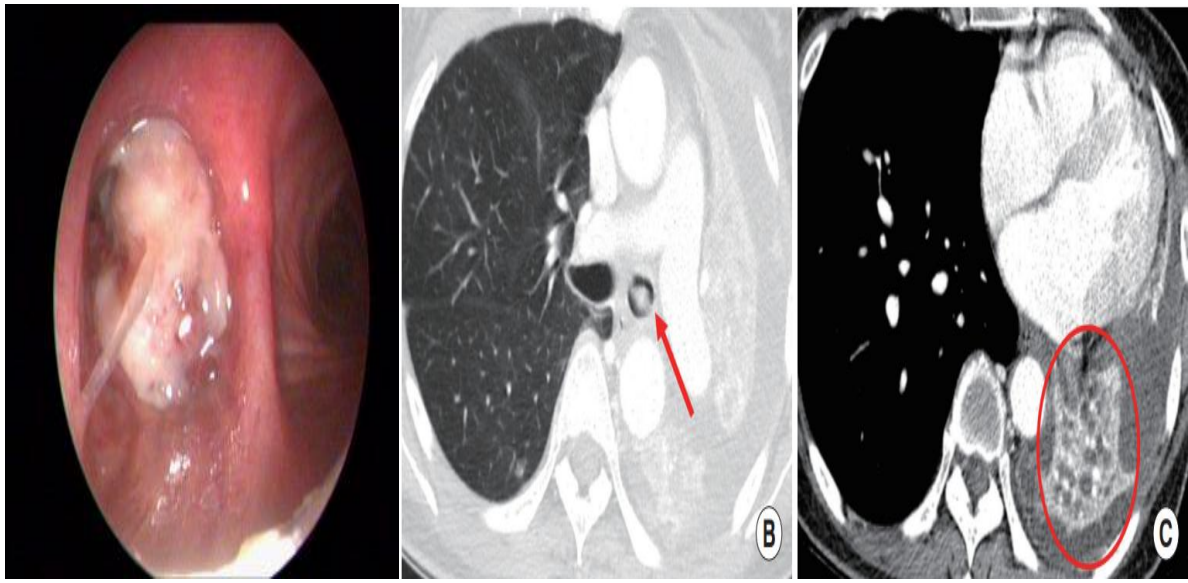
- Etyoloji
- Havayolu darlığının derecesi
- Stenozun uzunluğu
- Stenozun yeri
- Morfoloji (stenozun şekli/multifokal hastalık)



Stenozlarda tedaviyi etkileyen faktörler

- Fonksiyonel parankim
- Fonksiyonel pulmoner arter
- Profilaktik endobronşial tedavi
- Elektif şartlar





Bronkoskopik Teknikler İle

Optimum hava yolu açıklığı sağlayarak,
yeterli oksijenasyon ve ventilasyon elde edilmesi ile

- **Semptomlarda rahatlama, fonksiyonel düzelme**
- **Enfeksiyon Kontrolü**
- **Onkolojik tedaviye hazırlık (RT, KT)**

YAŞAM KALİTESİ ve SURVİ

Du Rand IA, et al. BTS Interventional Bronchoscopy Guideline Group. British Thoracic Society guidelines for advanced diagnostic and therapeutic flexible bronchoscopy in adults. Thorax. 2011;66(suppl 3):iii1-iii21

Endobronşiyal tedavi yöntemleri

- **Sıcak töntemler**

  Elektrokoter,
  Argon plazma koagulasyon (APC)
  Lazer

- **Soğuk yöntemler**

  Kriyoterapi

- **Rijid bronkoskopla mekanik temizleme**
- **Dilatasyon**

Endobronşiyal stent uygulanması

Brakiterapi
Fotodinamik tedavi

Endobronşiyal tedavi yöntemleri

Hızlı etki

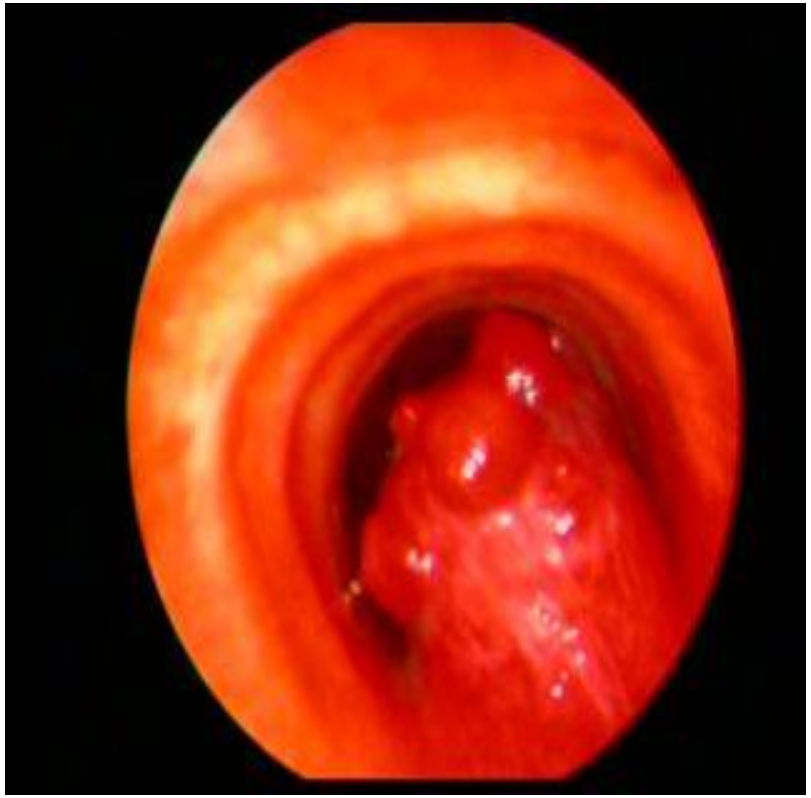
Mekanik debulking

Laser, APC

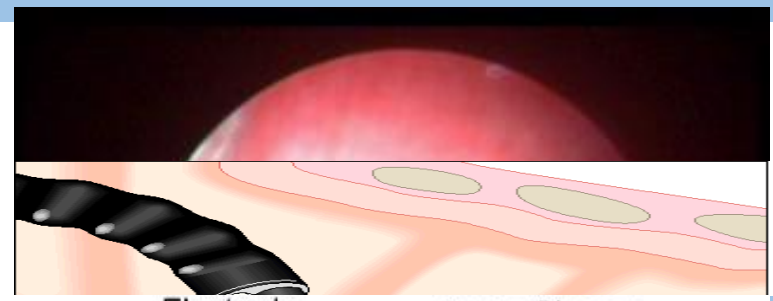
Stent

PDT

Kriyoterapi

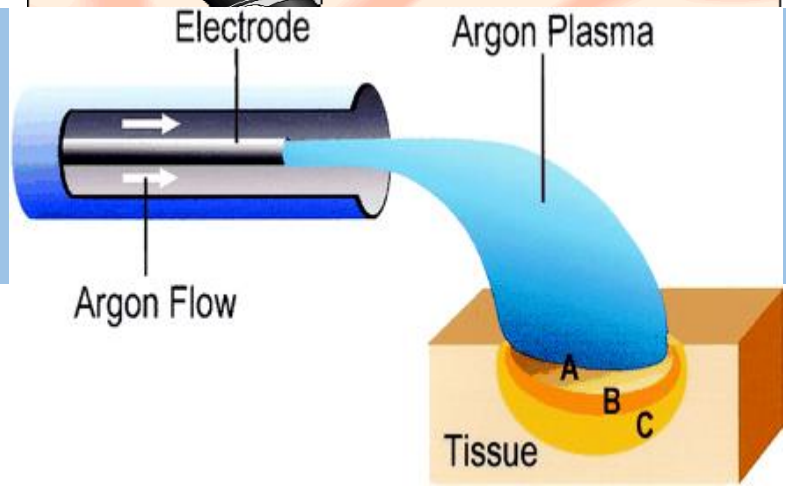


KARŞILAŞTIRMA



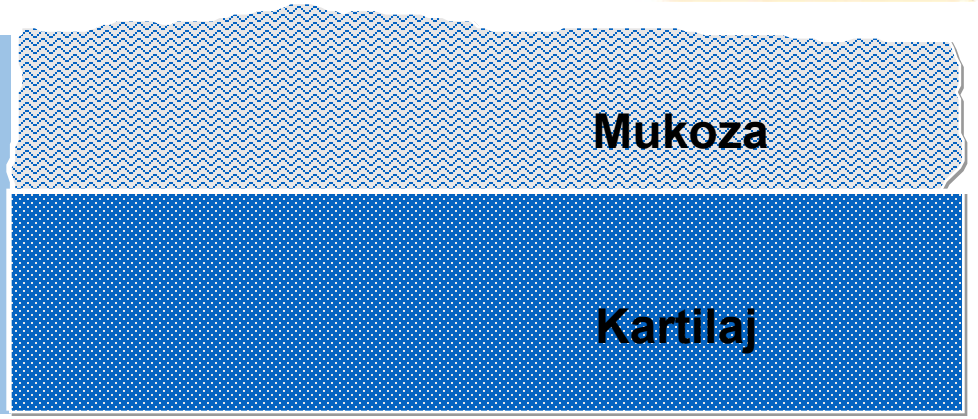
DOKU TEMASI

- Kriyoterapi (+)
- Elektrokoter (+)
- APC (-)



PENETRASYON

- Kriyoterapi
- APC
- Elektrokoter
- Laser



SICAK YÖNTEMLER KOMPLİKASYON

Hava yolu yanığı

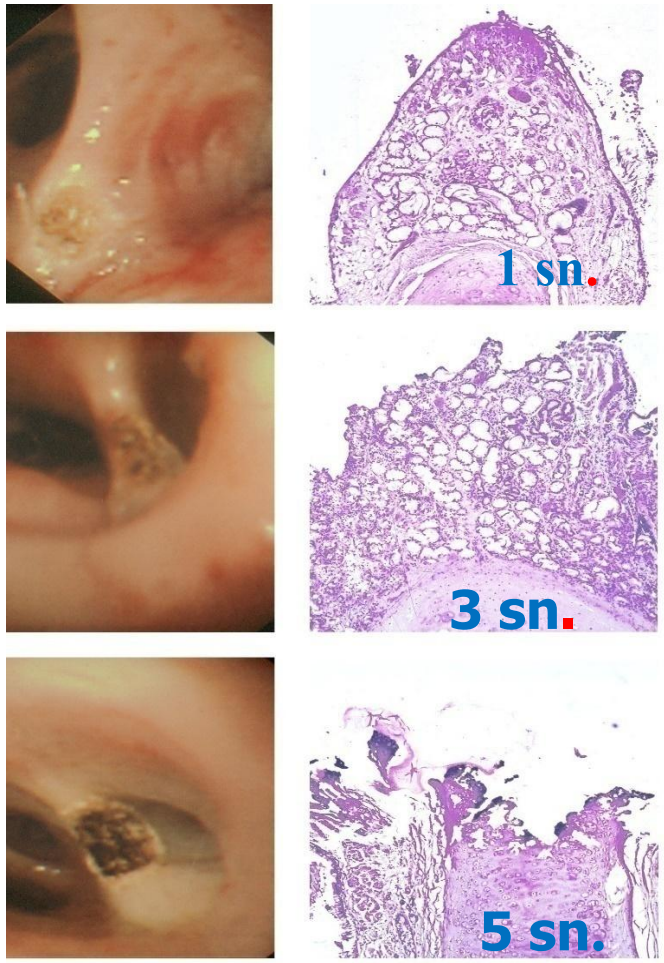
Perforasyon

NE YAPALIM?

Fi02 %40 dan az

Düşük güç

Düşük uygulama zamanı



Van Boxem, Chest 2000;117:125-8

Management of Central Airway Obstruction

An American College of Chest Physicians Clinical Practice Guideline

Kamran Mahmood, MD, MPH; Lindsy Frazer-Green, PhD; Anne V. Gonzalez, MD, MSc; Scott L. Shofer, MD, PhD; Angela Christine Argento, MD; Ian Welsby, MD; Russell Hales, MD; Samira Shojaee, MD, MPH; Donna D. Gardner, DrPH; Joe Y. Chang, MD, PhD; Felix J. F. Herth, MD, PhD; and Lonny Yarmus, DO, MBA

BACKGROUND: Central airway obstruction (CAO), seen in a variety of malignant and nonmalignant airway disorders, is associated with a poor prognosis. The management of CAO is dependent on provider training and local resources, which may make the clinical approach and outcomes highly variable. We reviewed the current literature and provided evidence-based recommendations for the management of CAO.

METHODS: A multidisciplinary expert panel developed key questions using the Patient, Intervention, Comparator, and Outcomes format and conducted a systematic literature search using MEDLINE (PubMed) and the Cochrane Library. The panel screened references for inclusion and used vetted evaluation tools to assess the quality of included studies and extract data, and graded the level of evidence supporting each recommendation. A modified Delphi technique was used to reach consensus on recommendations.

RESULTS: A total of 9,688 abstracts were reviewed, 150 full-text articles were assessed, and 31 studies were included in the analysis. One good practice statement and 10 graded recommendations were developed. The overall certainty of evidence was very low.

CONCLUSIONS: Therapeutic bronchoscopy can improve the symptoms, quality of life, and survival of patients with malignant and nonmalignant CAO. Multi-modality therapeutic options, including rigid bronchoscopy with general anesthesia, tumor/tissue debridement, ablation, dilation, and stent placement, should be utilized when appropriate. Therapeutic options and outcomes are dependent on the underlying etiology of CAO. A multidisciplinary approach and shared decision-making with the patient are strongly encouraged.

CHEST 2025; 167(1):283-295

MALİGN HAVA YOLU OBSTRÜKSİYONLARI

PRİMER AKCİĞER TÜMÖRLERİ

- Akciğer karsinomu
- Karsinoid Ttümör
- Karsinosarkom
- Pulmoner sarkom
- Adepnoid kistik karsinom (ACC)
- Mukoepidermoid karsinom

MEDİASTİNAL TÜMÖRLER

- Timik karsinom
- Tiroid kanseri
- Germ hücreli tümörler (Teratoma, vs…)
- Larinks kanseri
- Özofagus kanseri
- Lenfoma (Hodgkin ve non-Hodgkin)
- Diğer tümörlere bağlı lenfadenopatiler

METASTATİK TÜMÖRLER

- Renal hücreli karsinom
- Meme kanseri
- Kolorektal karsinom
- Sarkom
- Melanom
- Over kanseri
- Uterus kanseri
- Testis kanseri
- Nazofarinks kanseri
- Adrenal karsinom
- Kronik Lenfositik Lösemi

TÜBİTAK

Turkish Journal of Medical Sciences

http://journals.tubitak.gov.tr/medical/

Research Article

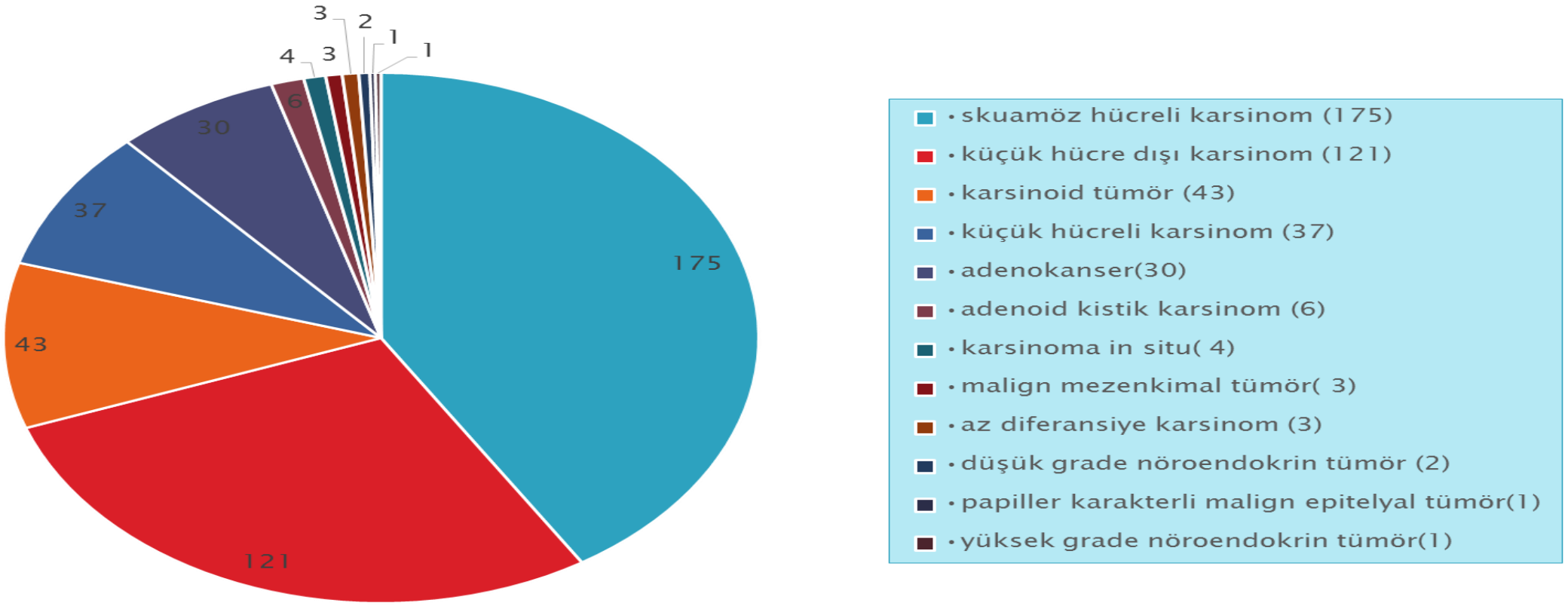
Turk J Med Sci
(2019) 49: 1455-1463
© TÜBİTAK
doi:10.3906/sag-1904-20

What have we learned in interventional pulmonology in the past decade?

Mehmet Akif ÖZGÜL[1], Erdoğan ÇETİNKAYA[1], Demet TURAN[1],
Efsun Gonca UĞUR CHOUSEIN[1,*], Deniz DOĞAN[2], Ekrem Cengiz SEYHAN[1]

[1]Department of Pulmonology, Yedikule Chest Diseases and Thoracic Surgery Training and Research Hospital, Health Sciences University, İstanbul, Turkey

[2]Department of Pulmonology, Gulhane Training and Research Hospital, Health Sciences University, Ankara, Turkey



Akciğer Kanseri - Ölüm

Akciğer kanserli hastaların % 35-40'ı lokal hastalığın progresyonundan ölürler

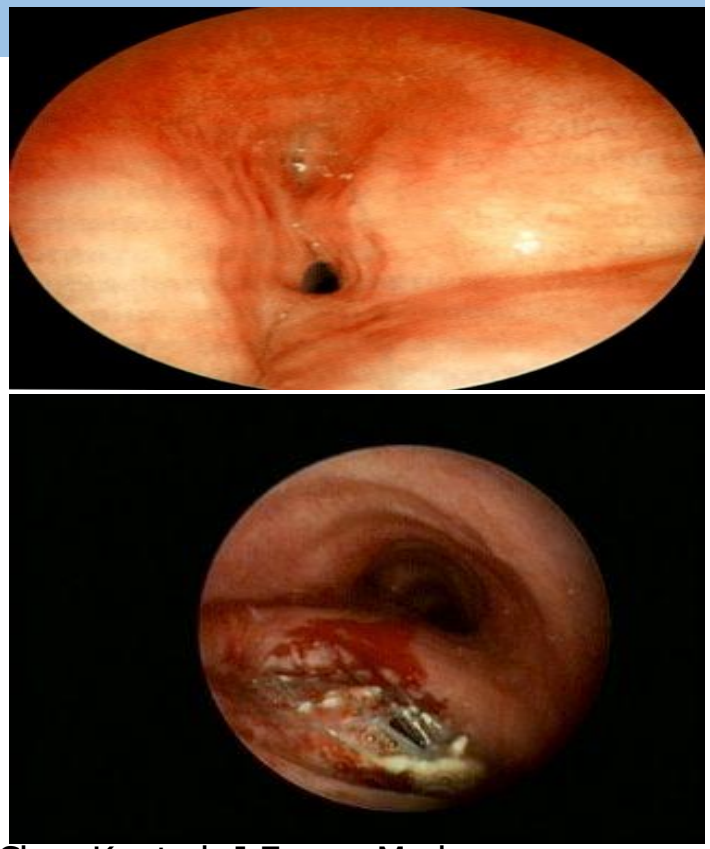
- **Malign Plevral /Perikardiyal Effüzyon**
- **Vena Cava Superior Sendromu**

- **Masif Hemoptizi**
- **Trakea özefagial Fistül**
- ***Büyük Hava Yolu Darlıkları***

%14-30 akciğer kanseri ve büyük hava yolu stenozu

Yaşam kalitesi kötü

Prognoz kötü



Chen K, et al. J Emerg Med. 1998;16(1):83-92.
Ernst A, et al. Am J Respir Crit Care Med. 2004;169(12):1278-1297.
Carrol et al. Eur J Cancer Clin Oncol 1986;22:1352-56

NEDEN YAPMALIYIZ

Radyoterapi

- Obstrüksiyon → Atelektazi %21

Kemoterapi

- Obstrüksiyon → Atelektazi %20

Danesvar Breen D Open respir res 2019 Sep 24 :6(1)

Interventional pulmonology for patients with central airway obstruction

An 8-year institutional experience

Chia-Hung Chen,[a,b,c] Biing-Ru Wu,[a,e] Wen-Chien Cheng,[a,e,d] Chih-Yu Chen,[a,e] Wei-Chun Chen,[a,e,d] Te-Chun Hsia,[a,b,d] Wei-Chih Liao,[a,c,d,*] Chih-Yen Tu,[a,e,f,*] and Wu-Huei Hsu[a,e]

Medicine®

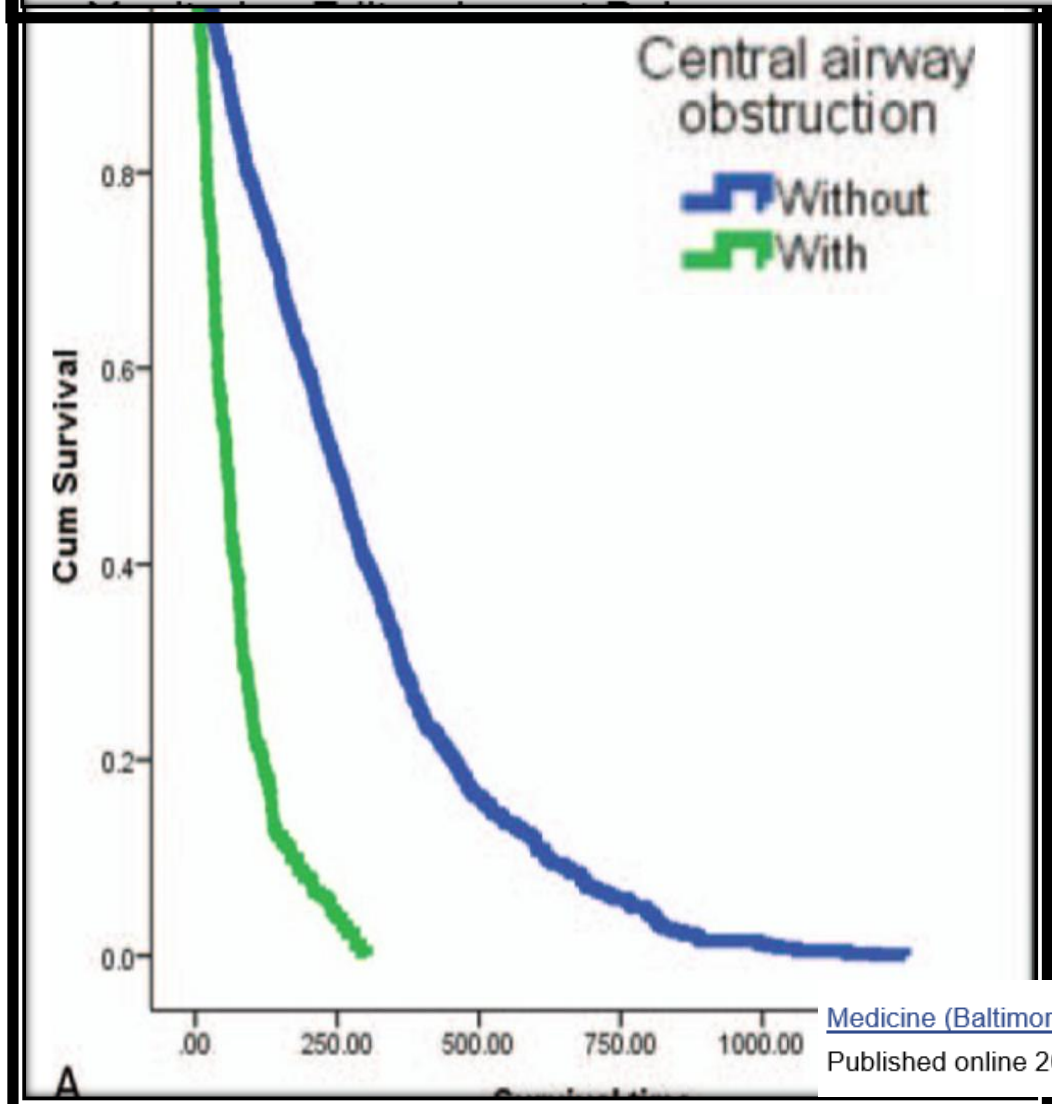
Variable	No., %
Endoscopic success	583 (95)
Mortality after procedure	4 (0.7)
Major morbidity	
Halitosis	41 (6.7)
Iatrogenic pneumonia	24 (3.9)
Granulation tissue formation	16 (2.6)
Stent infections	11 (1.8)
Stent migration	8 (1.3)
Stent fracture	2 (0.3)
Pneumothorax	6 (1.0)

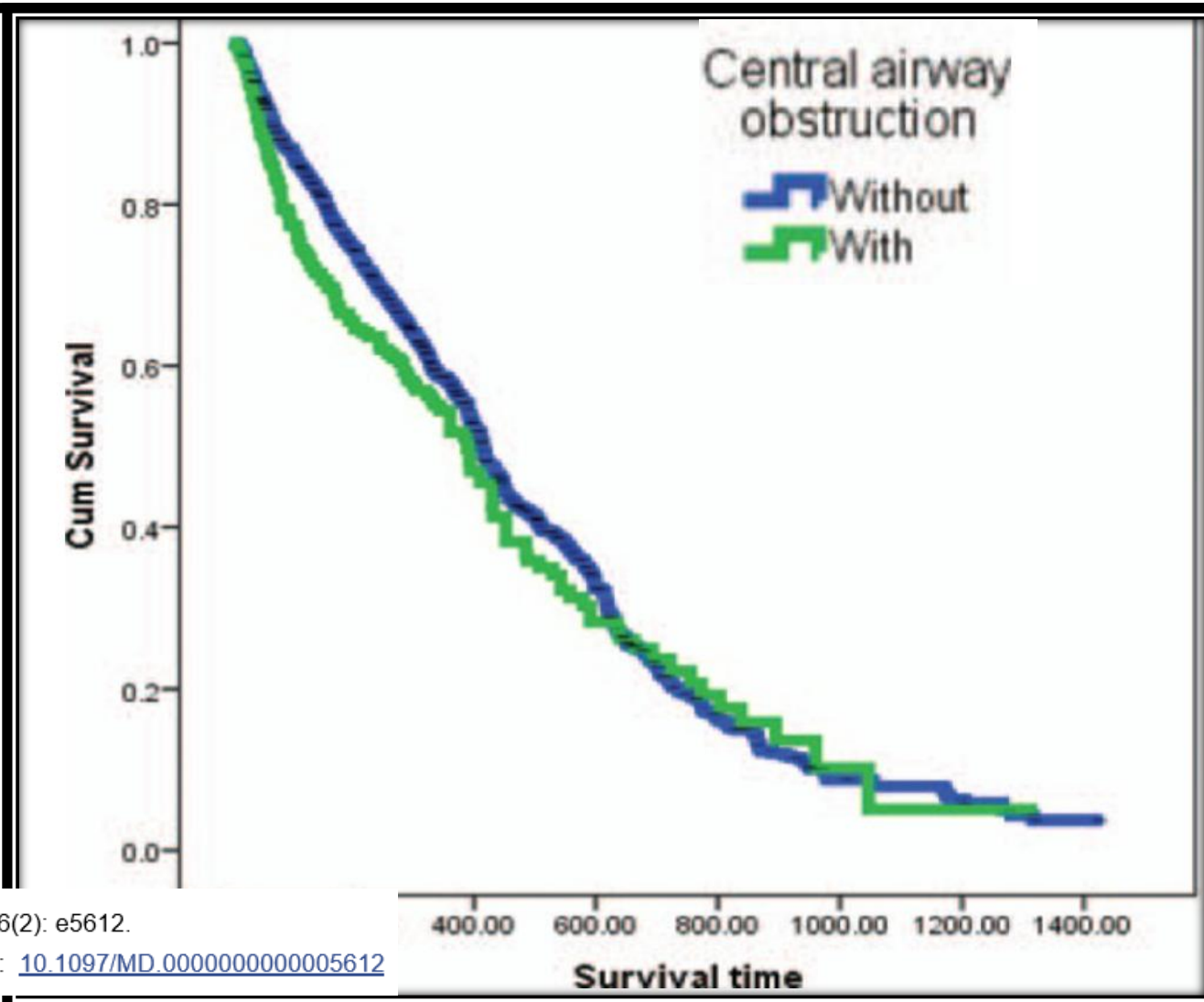
Medicine (Baltimore). 2017 Jan; 96(2): e5612.
Published online 2017 Jan 13. doi: 10.1097/MD.0000000000005612

Interventional pulmonology for patients with central airway obstruction

An 8-year institutional experience

Chia-Hung Chen,[a,b,c] Biing-Ru Wu,[a,e] Wen-Chien Cheng,[a,e,d] Chih-Yu Chen,[a,e] Wei-Chun Chen,[a,e,d] Te-Chun Hsia,[a,b,d] Wei-Chih Liao,[a,c,d,*] Chih-Yen Tu,[a,e,f,*] and Wu-Huei Hsu[a,e]





Medicine (Baltimore). 2017 Jan; 96(2): e5612.
Published online 2017 Jan 13. doi: 10.1097/MD.0000000000005612

Lung Cancer. 2020 Oct:148:40-47. doi: 10.1016/j.lungcan.2020.07.032. Epub 2020 Aug 2.

Integrated intErventional bronchoscopy in the treatment of locally adVanced non-small lung cancER with central Malignant airway Obstructions: a multicentric REtrospective study (EVERMORE)

Alessandro Marchioni [1], Dario Andrisani [2], Roberto Tonelli [3], Roberto Piro [4], Alessandro Andreani [5], Gaia Francesca Cappiello [6], Emmanuela Meschiari [7], Massimo Dominici [8], Mario Bavieri [9], Fausto Barbieri [10], Sofia Taddei [11], Eleonora Casalini [12], Francesco Falco [13], Filippo Gozzi [14], Giulia Bruzzi [15], Riccardo Fantini [16], Luca Tabbì [17], Ivana Castaniere [18], Nicola Facciolongo [19], Enrico Clini [20]; EVERMORE Study group

Abstract

Objectives: Despite new therapeutic perspectives, the presence of central airways occlusion (CAO) in patients with locally advanced non-small cell lung cancer (NSCLC) is associated with poor survival. There is no clear evidence on the clinical impact of interventional bronchoscopy as a part of an integrated treatment to cure these patients.

Materials and methods: This retrospective cohort study was conducted in two teaching hospitals over a 10 years period (January 2010-January 2020) comparing patients with NSCLC at stage IIIB and CAO at disease onset treated with chemotherapy/radiotherapy (standard therapy-ST) with those receiving interventional bronchoscopy plus ST (integrated treatment-IT). Primary outcome was 1-year survival. The onset of respiratory events, symptoms-free interval, hospitalization, need for palliation, and overall mortality served as secondary outcomes.

Results: A total of 100 patients were included, 60 in the IT and 40 in the ST group. Unadjusted Kaplan-Meier estimates showed greater effect of IT compared to ST on 1-year survival (HR = 2.1 95%CI[1.1-4.8], p = 0.003). IT showed a significantly higher survival gain over ST in those patients showing KRAS mutation (7.6 VS 0.8 months, <0.0001), a lumen occlusion >65% (6.6 VS 2.9 months, <0.001), and lacking the involvement of left bronchus (7 VS 2.3 months, <0.0001). Compared to ST, IT also showed a favorable difference in terms of new hospitalizations (p = 0.03), symptom-free interval (p = 0.02), and onset of atelectasis (p = 0.01).

Conclusions: In patients with NSCLC stage IIIB and CAO, additional interventional bronchoscopy might impact on 1-year survival. Genetic and anatomic phenotyping might allow identifying those patients who may gain life expectancy from the endoscopic intervention.

Review > Cureus. 2023 Jun 24;15(6):e40912. doi: 10.7759/cureus.40912. eCollection 2023 Jun.

Malignant Airway Obstruction and Endobronchial Stent Placement: A Systematic Review on the Efficacy and Safety

Zaryab Umar [1], Muhammad Haseeb Ul Rasool [2], Asma U Hosna [1], Avish Parikh [1], Jonathan Ariyaratnam [3], Jasmine K Sandhu [1], Salman Ashfaq [4], Nazaakat Ahmed [5], Jawad Khan [1], Theo Trandafirescu [2]

Affiliations + expand

Abstract

The systematic review aims to evaluate the efficacy and safety of endobronchial stent placement for malignant airway obstruction. A comprehensive search was conducted across multiple databases to identify relevant studies. Cohort studies, randomized controlled trials, and case-control studies examining the outcomes of endobronchial stent placement in patients with malignant airway obstruction were included. Data on pre-treatment evaluation, such as pulmonary function testing, dyspnea severity scoring systems, arterial blood gas parameters, imaging, and degree of obstruction, were also collected. Primary outcomes of interest included post-procedure stenosis, pulmonary function testing evaluation, blood gas parameters, and survival outcomes. Secondary outcomes encompassed improvements in clinical status, dyspnea grade, and procedure-related complications. A total of 27 studies met the inclusion criteria and were included in the systematic review. The included studies demonstrated promising outcomes of endobronchial stent placement in managing malignant airway obstruction. Post-procedure airway diameters, pulmonary function testing, and blood gas parameters improved significantly. Survival outcomes varied among studies. Furthermore, endobronchial stent placement was associated with improvements in clinical status and dyspnea grade. Procedure-related complications ranged from pain, hemoptysis and mucus plugging to stent obstruction, migration and pneumothorax. This systematic review suggests that endobronchial stent placement is an effective and safe intervention for managing malignant airway obstruction. It offers significant improvements in post-procedure stenosis, pulmonary function testing, blood gas parameters, and clinical outcomes. However, further studies with larger sample sizes and standardized reporting are warranted to better evaluate the long-term efficacy and safety of endobronchial stent placement for malignant airway obstruction.

Trakeobronşiyal Stent Takılan Hastalarda Yaşam Kalitesi, Uyku Ve Anksiyete Değişimi

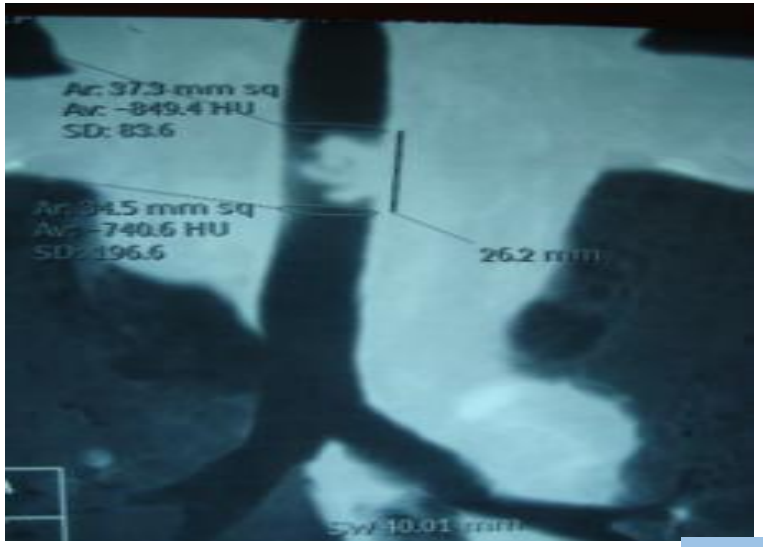
Demet Turan[1] , Efsun Gonca Uğur Chousein[1] , Alev Cinel Karataş[1] , Yaşar İncekara[2] , **Abdullah Çağrı Önal**[1] , Şeyma Kapçık[1] , Fatma Meyra Söylemez[1] , Ahmet Pehlivan[1] , Mehmet Akif Özgül[1] , Erdoğan Çetinkaya[1]

Gereç ve Yöntem: Ocak-Eylül 2024 tarihleri arasında retrospektif olarak yapılan çalışmada, havayolu obstrüksiyonu nedeniyle stentlenen hastaların stent öncesi ve sonrası 1.ayda SF-36 anketi, beck anksiyete ölçeği ve PUKİ anketleri yapılmıştır. Hastalık etiyolojilerinin yaşam kalitesi, uyku kalitesi, ve ansiyete düzeyine etkisi ve stentleme sonrası bu anketlerin değerlendirmesinde farklılıklar olup olmadığı araştırılmıştır. Çalışmada verilerin analizinde uyku kalitesi, anksiyete düzeyi ve yaşam kalitesine ilişkin değişkenlerin öntest ve sontest ölçümleri arasındaki farklılıkları değerlendirmede bağımlı gruplar için t-testi uygulanmıştır. Değişkenler arasındaki farkların anlamlılığı $p<0,05$ düzeyinde test edilmiştir.

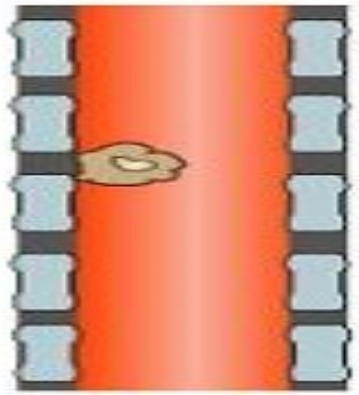
Bulgular: Stent yerleştirilen 106 hastanın %63,2 erkek olup yaş ortalaması 56,34±12,16 idi. Havayolu obstrüksiyonu olan hastaların %56,6'sında etyoloji maligniteye bağlı iken, %43,4'sında postentübasyon trakeal stenoz kaynaklı idi. Hastaların uyku kalitesi, anksiyete düzeyi ve yaşam kalitesi ölçümleri öntest ve sontest değerleri karşılaştırıldığında, tüm değişkenlerde anlamlı iyileşmeler olduğu görülmektedir ($p=0,000$). (Tablo) Trakeal stent nedeni açısından hastaların uyku kalitesi ve anksiyete ölçekleri açısından öntest ve sontest puanları incelendiğinde, tümör ve PITS grupları arasında anlamlı bir fark olmadığı görülmektedir ($P>0.05$). Ancak yaşam kalitesine ilişkin bazı alt boyutlarda gruplar arasında farklılık olduğu belirlenmiştir.

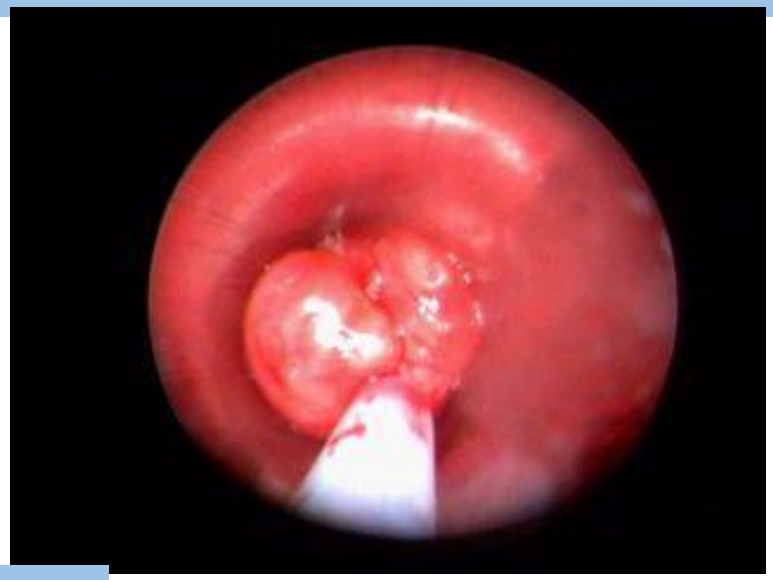
Tartışma-Sonuç: Çalışmamız havayolu obstrüksiyonu olan uygun hastalara zamanında yapılacak endobronşiyal tedavi yöntemi olan stentleme işleminin hastaların uyku kalitesi, anksiyete düzeyi ve yaşam kalitesi üzerindeki olumlu etkisini göstermektedir. Özellikle fiziksel ve duygusal boyutlarda yaşanan anlamlı artışlar, hastaların genel sağlık durumlarının ve psikolojik iyilik hallerinin geliştiğini desteklemektedir. Bu hastaların zamanında endobronşiyal tedavi yapılan merkezlere refere edilmesi ve farkındalığın sağlanması amaçlanmıştır.

Endobronşiyal tedavi yöntemleri



ENDOLÜMİNAL





Hızlı Yöntem

Mekanik rezeksiyon
Lazer
Elektrokoter
APC
Kriyoekstraksiyon

1 Wahidi MM. Chest 2007;131:261-274
2 Herth FJ. Chest 2005;128(4):209

	Başarı
Kriyoekstraksiyon	% 91 (1)
Mekanik Rezeksiyon	% 83 (2)

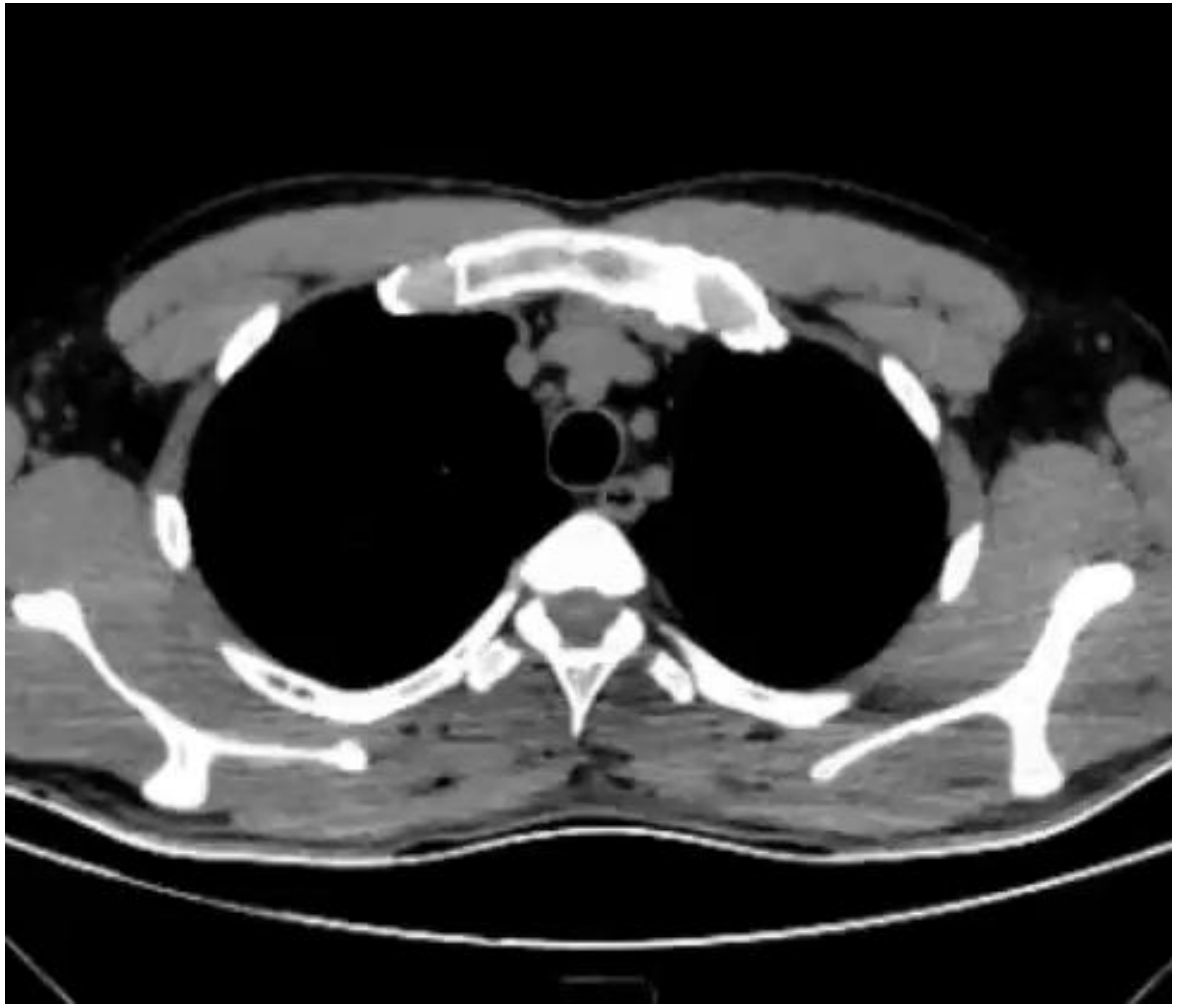
	Başarı
Lazer	% 83-93 (1)
Elektrokoter	% 88-89 (1)
APC	% 91-96 (1,2)

OLGU 1

- 34 yaşında, erkek
- Şikayeti:Nefes darlığı, solunum sıkıntısı
- Hikaye: Diyarbakır’da 1 hafta önce bu şikayetleri üzerine çekilen BT ve sonrasında bronkoskopisinde sol ana bronşu tam oblitere eden kitle görülmesi üzerine biyopsi alınmayıp bize refere edilmiş

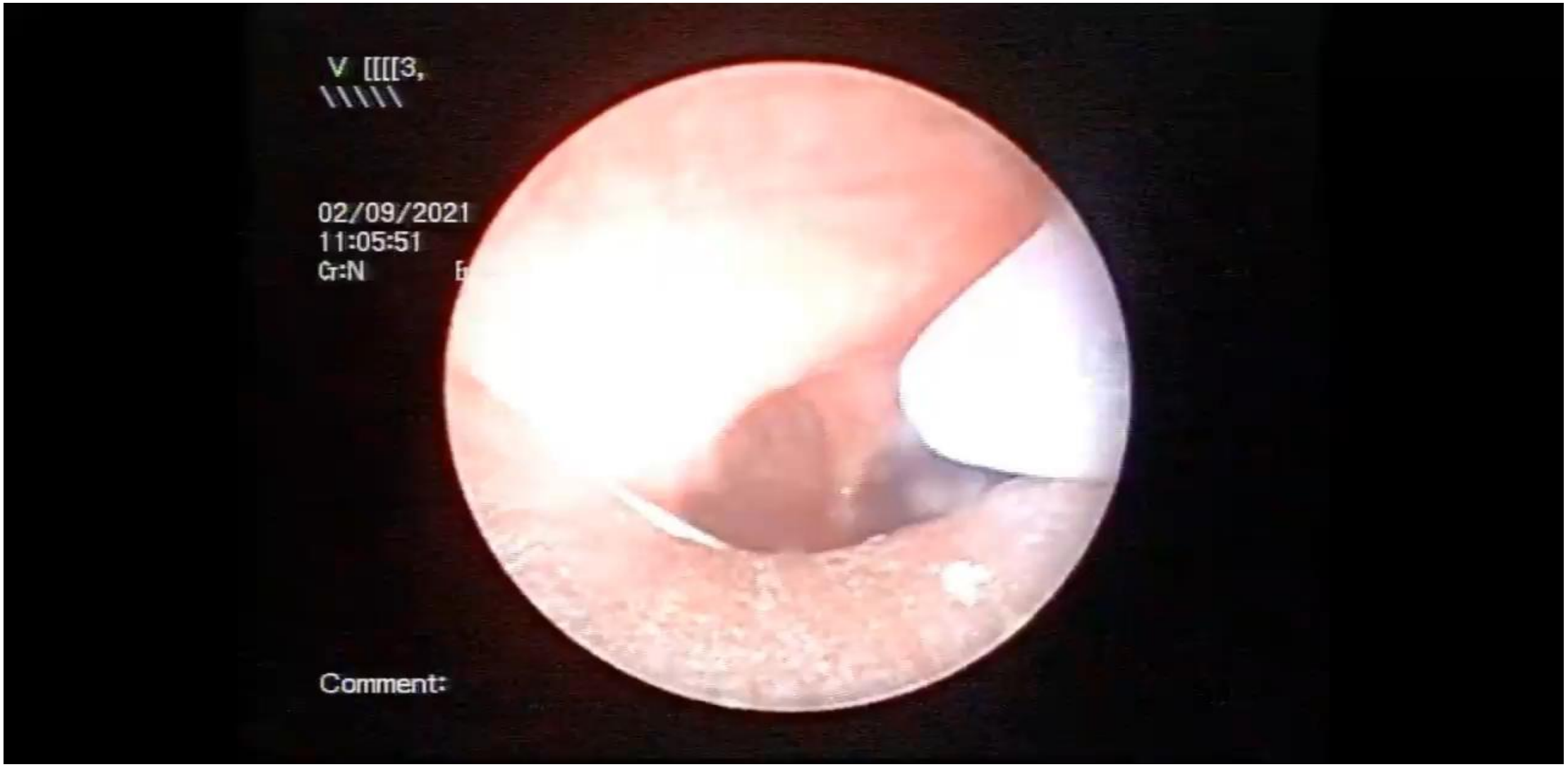
OLGU 1

- Özgeçmiş: Bir özellik yok
- Alışkanlık: Sigara: 15p/yıl, aktif içici
- Fizik Muayene:
- TA: 100/70 NDS:78/dak
- Sat: %95(oda) SDS: 13/dakika
- Solunum sistemi: Solda solunum
- sesleri azalmış



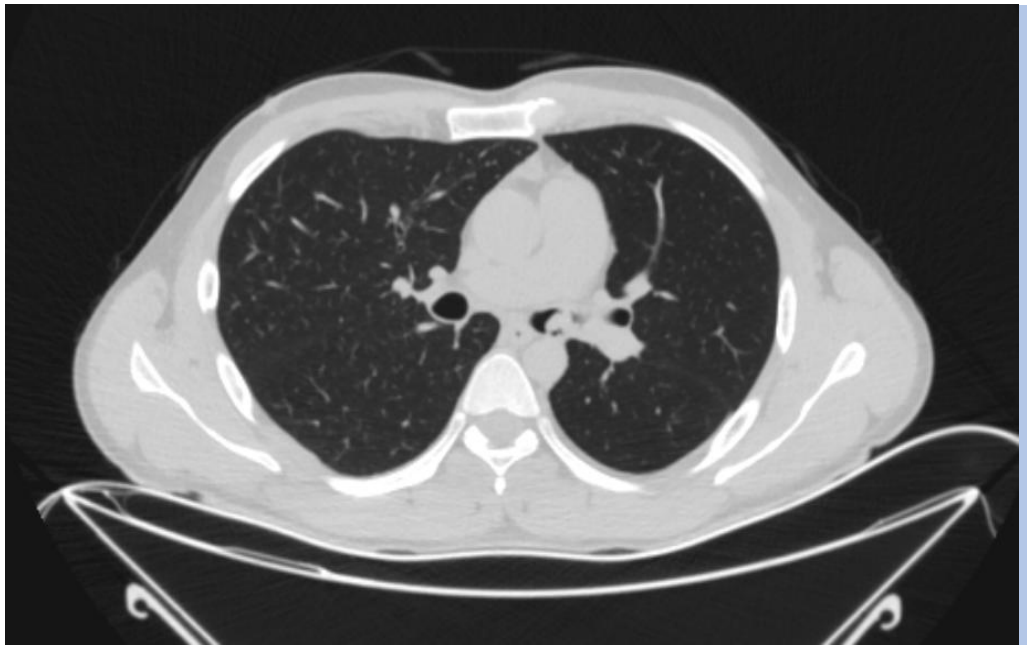
OLGU 1

RİJİD BRONKOSKOPİ



OLGU 1

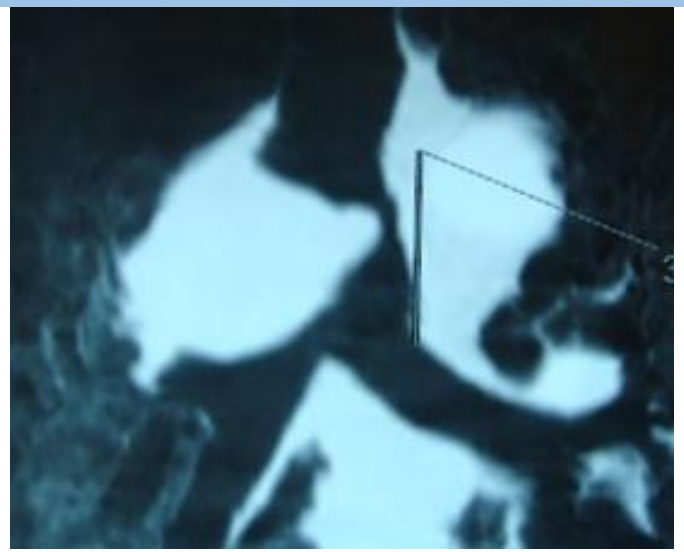
- **Patoloji: Düşük gradeli mukoepidermoid karsinom**



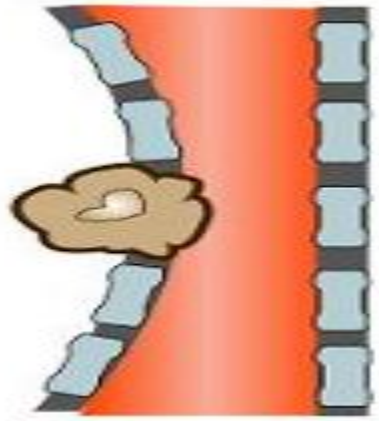
ÖNCESİ

SONRASI

Endobronşiyal tedavi yöntemleri



MİX STENOZ



Hızlı Yöntem

Lazer
Elektrokoter
APC
Mekanik Rezeksiyon
Kriyoekstraksiyon

Yavaş Yöntem

Kriyoterapi
PDT
Brakiterapi

Yöntem

STENT

Kalan darlık % 50 den fazla ise

OLGU 2

- 49 yaşında, erkek
- Şikayeti: Öksürük ve nefes darlığı
- Hikayesi: 2 ay önce polikliniğe başvurmuş, bronkodilatör önerilmiş
- Bronkodilatörden fayda görmeyip, hemoptizi de eklenince tekrar başvurmuş
- Özgeçmiş: Bir özellik yok
- Alışkanlık: 50p/yıl sigara, 1 aydır içmiyor

OLGU 2

- Başvuru AKG: PH: 7.46 SO2: 80
  PCO2: 27 PO2: 56

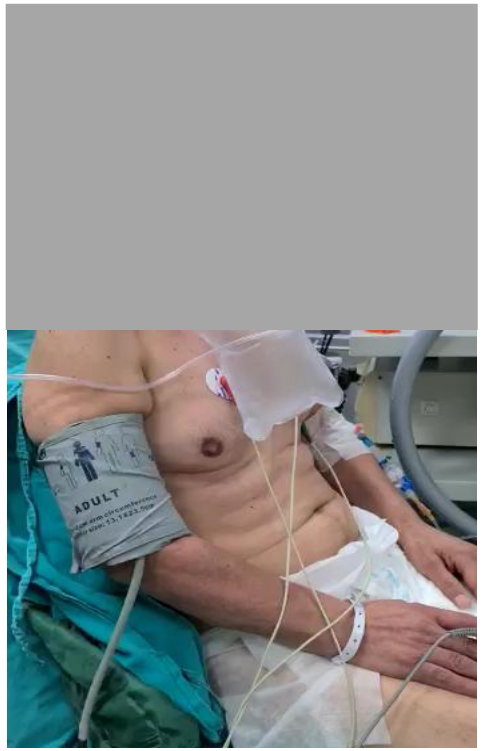
- Hipoksik olan hasta girişimsel bronkoskopik işlem için interne edildi
- İşlemi planlanan hasta solunum sıkıntısı artınca non-entübe olarak yoğun bakım ünitemize alındı

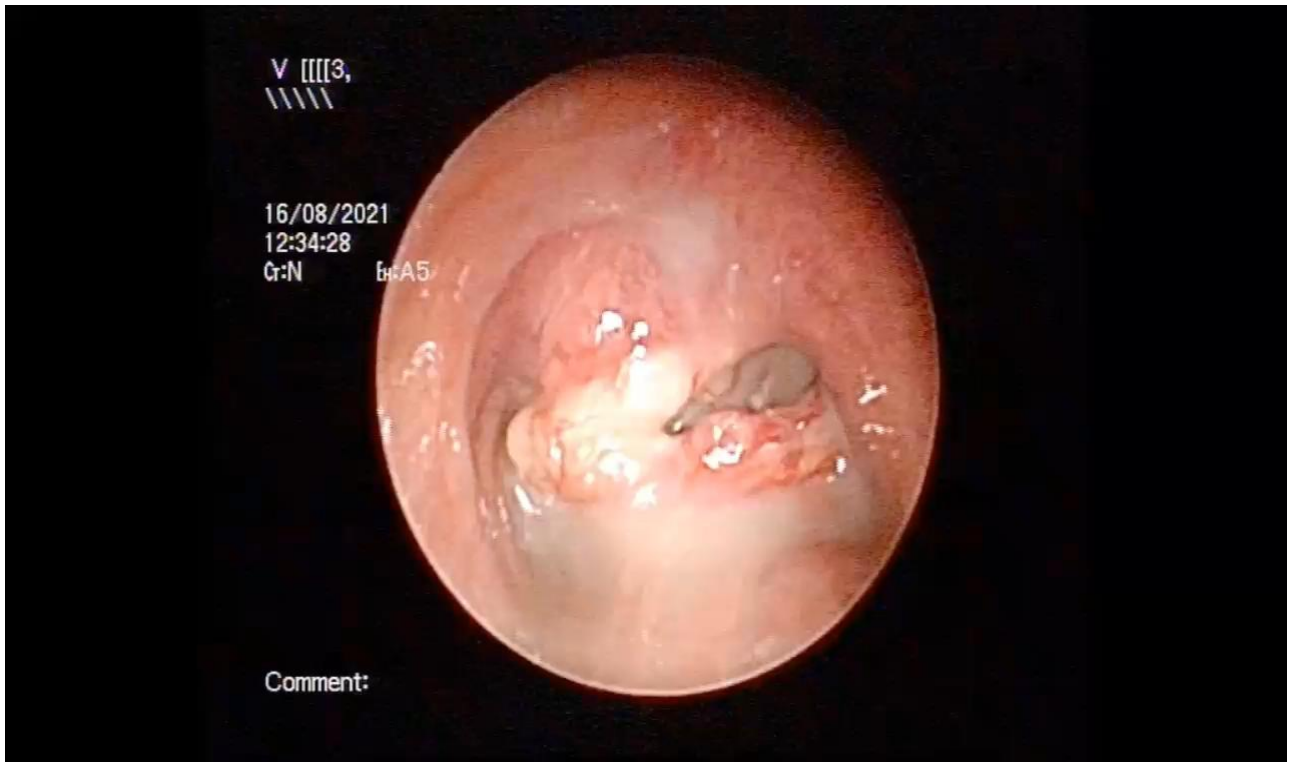
OLGU 2

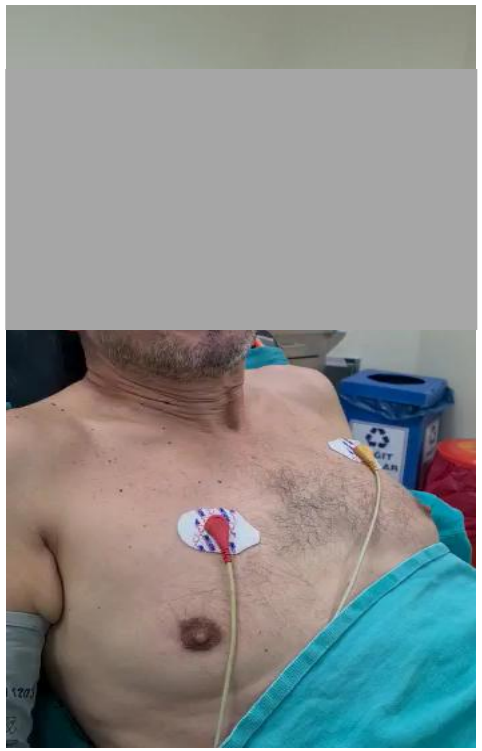
- İşleme giriş:
- **Sat %75** (16 L/dak rezervuarlı maske O2)

RİJİD BRONKOSKOPİ

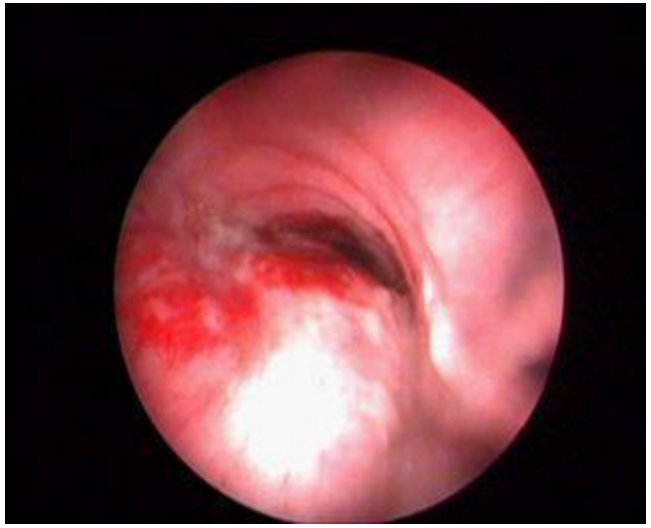
- İşlemden çıkış:
- **Sat %95** (oda havası)



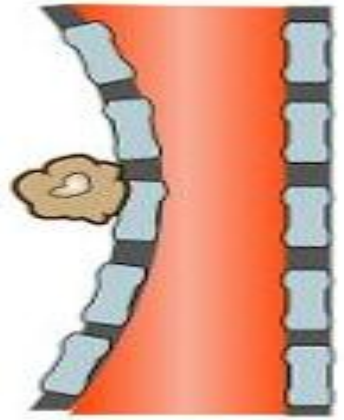




Endobronşiyal tedavi yöntemleri



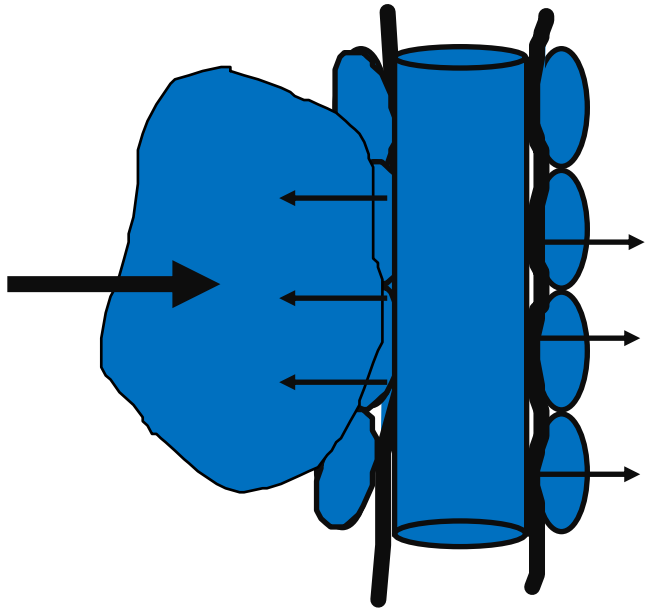
DIŞ BASI



Yöntem

Dilatasyon

STENT



	Başarı
Dilatasyon	% 43 (1)
Stent	% 82-97 (2)

1 Hautmann H, et al. Chest 2001;120:43-49.
2 Wahidi MM. Chest 2007;131:261-274

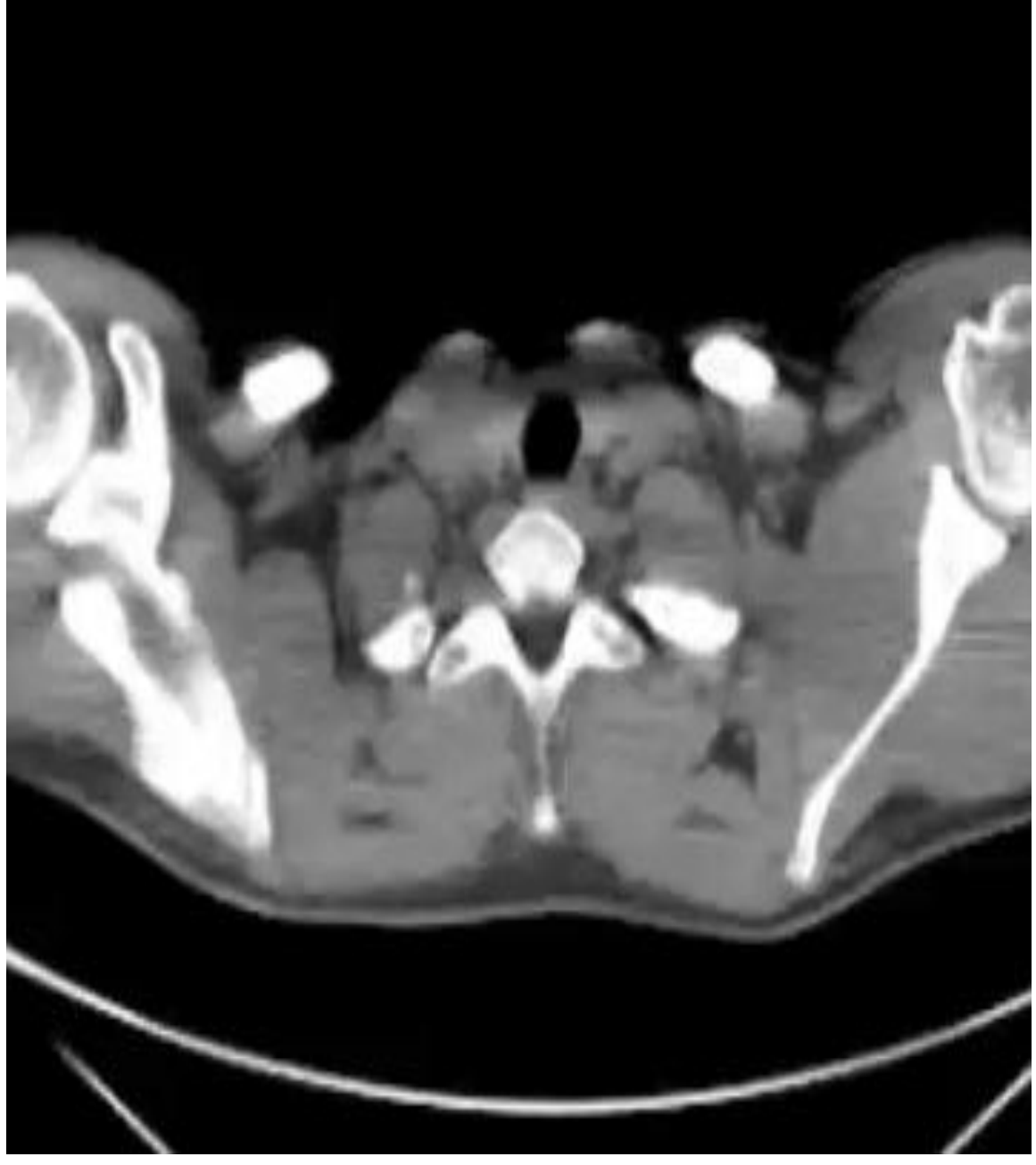
OLGU 3

- 23 yaşında, erkek
- Şikayeti: Nefes darlığı
- Hikayesi: Nisan 2018'de Ewing sarkomu tanısı ile onkolojik tedavi görmüş. 1.5 yıl kontrol altında kaldıktan sonra giderek artan nefes darlığı nedeni ile hastanemiz aciline başvurmuş ve interne edilmiş

PA AKCİĞER GRAFİSİ

OLGU 3

- Özgeçmiş: Ewing sarkomu (2018)
- Alışkanlık: 4p/yıl sigara, aktif içici
- Fizik muayene:
  TA: 110/80 NDS: 130/dak
  SDS: 30/dak
  Solunum sistemi: stridor(+)
- Laboratuar:
  WBC: 14.3910e3/uL PLT: 579 10e3/uL
  CRP: 132 mg/dL L



TORAKS BT

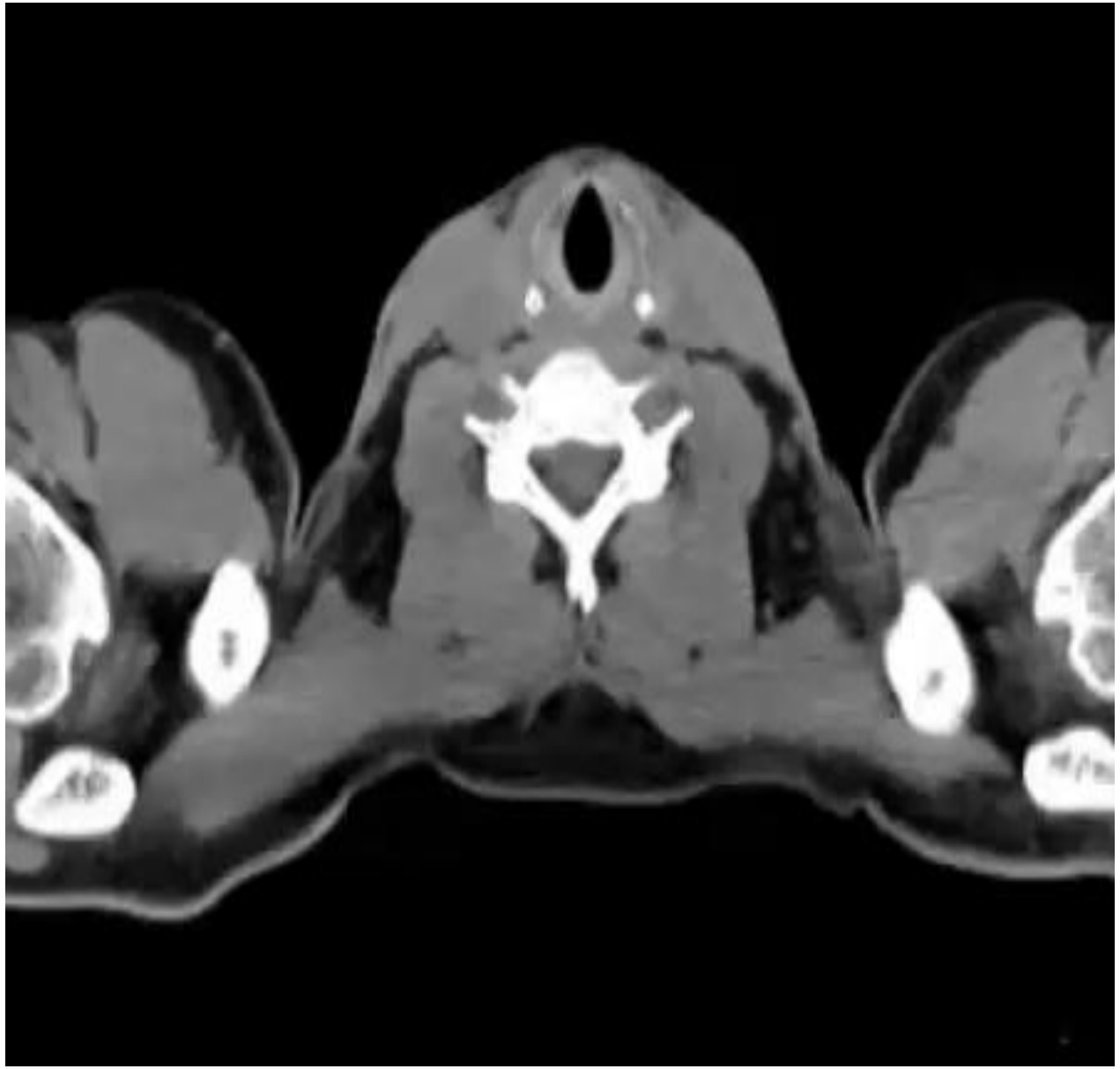
OLGU 3

İşlem öncesi satürasyonu % 70 (16/dakika O2 ile)

İşlem sonrası satürasyonu % 98 (2/dakika O2 ile)

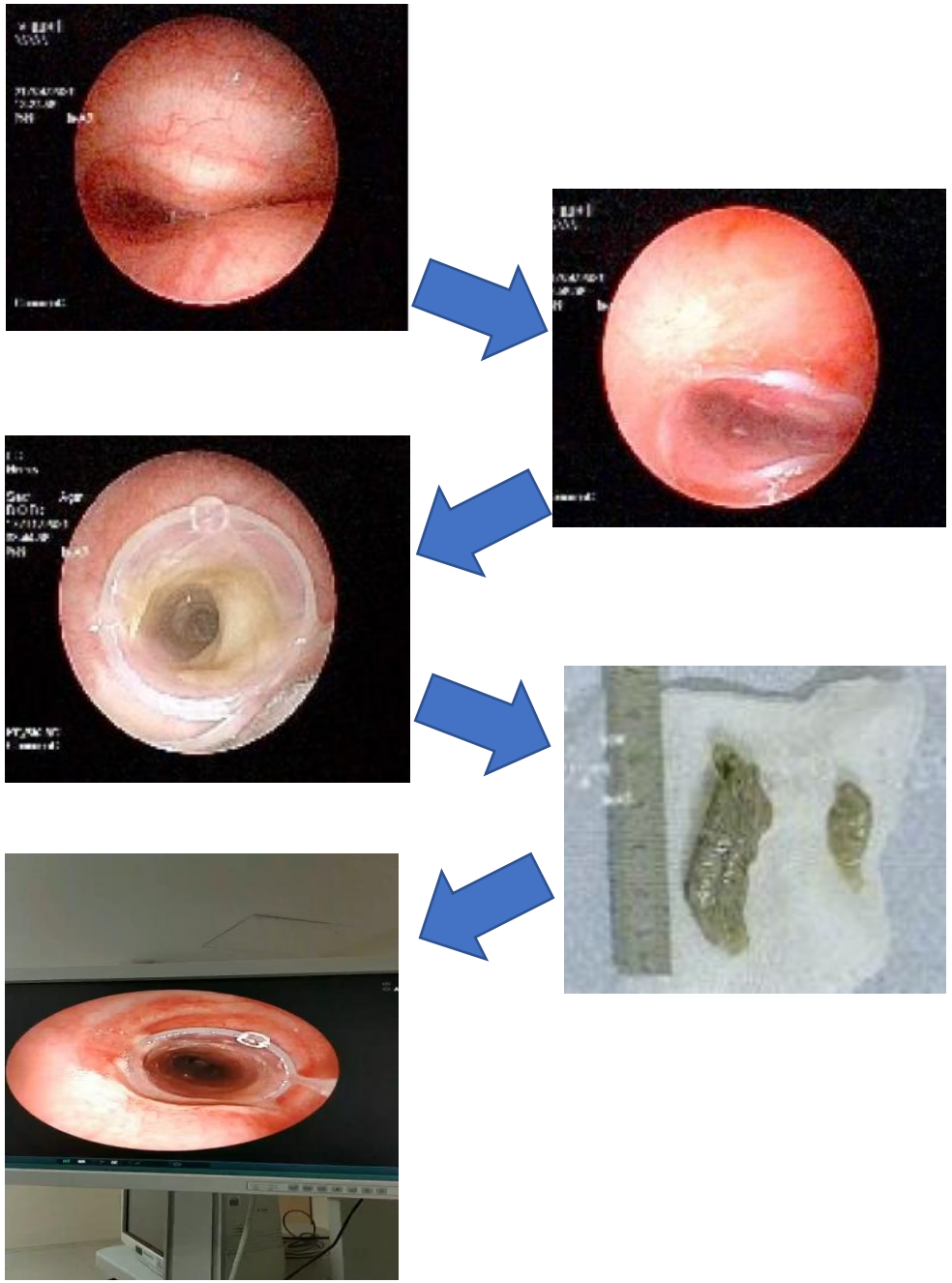
OLGU 3

- Hastamız onkolojik tedavisine devam edildi.RT'ye sekonder ağır bir özofajit atağı geçirdi, bu nedenle oral alımı kısıtlanınca dehidrate kaldı
- Stentinde gelişen mukostaz nedeni ile 2 kez rijid bronkoskopi uygulandı
- Pulmozyme ile mukostazı da kontrol altına alındı



OLGU 3

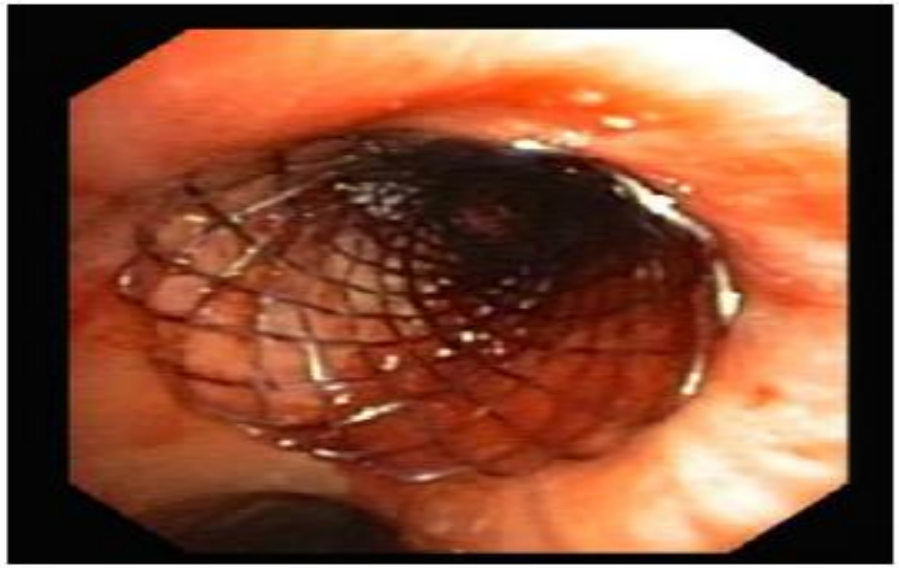
- Hastamız onkolojik tedavisi devam etmekte. RT'ye sekonder ağır bir özofajit atağı geçirdi, bu nedenle oral alımı kısıtlanınca dehidrate kaldı
- Stentinde gelişen mukostaz nedeni ile 2 kez rijid bronkoskopi uygulandı
- Pulmozyme ile mukostazı kontrol altına alındı.



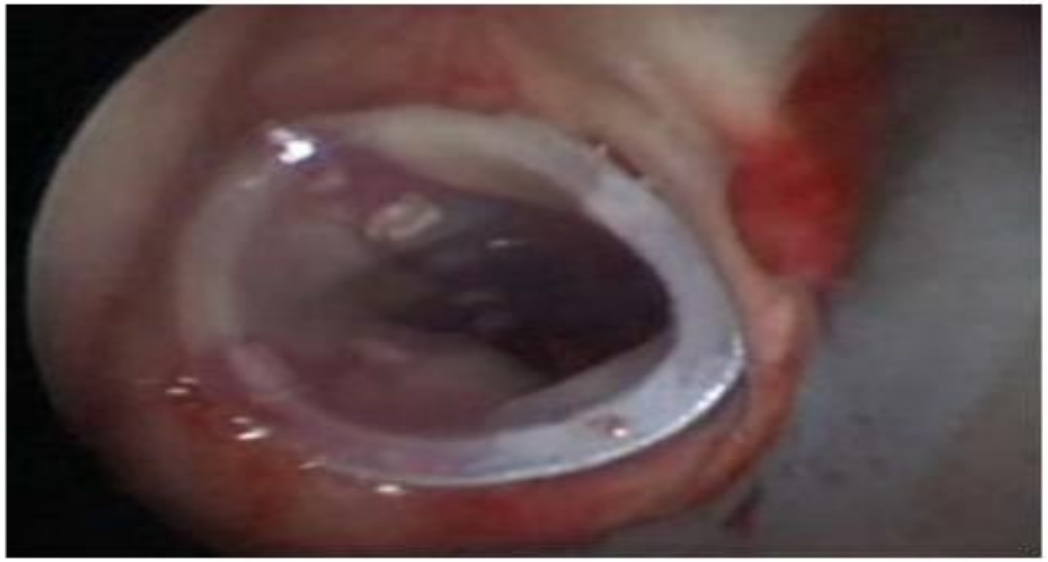
STENTLER

SİLİKON

METALİK



0.25 mm

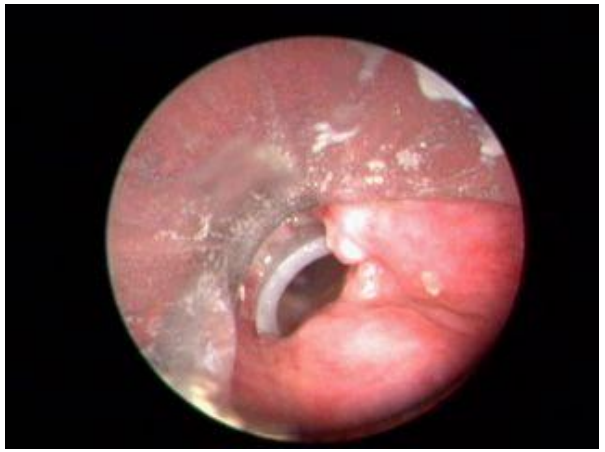


1.5 mm

- **Modifiye edilemez**
- **Hava yolu dinamiklerine adaptasyon**

GRANÜLASYON

Silikon	%0-6
Metalik stent	%5-30



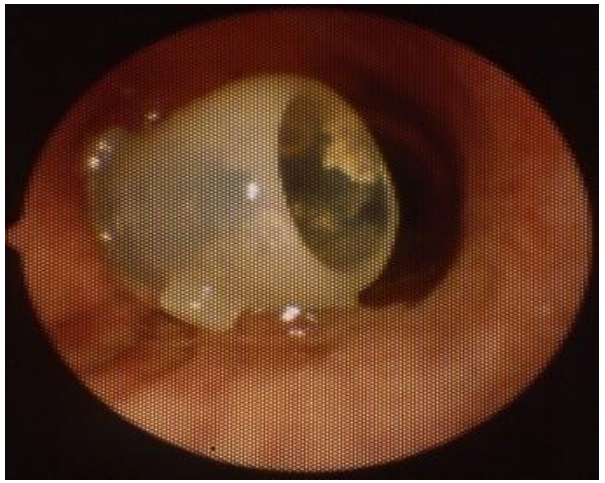
• MİGRASYON

- Silikon %3-13
- Metalik stent %0-17

Küçük çaplı stent

Dış basının düşük olduğu hastalar

- İntrensek malign stenoz
- Malazi



MUKOSTAZ

Silikon	%6-50
Metalik stent	%18-39

> Tuberk Toraks. 2019 Dec;67(4):272-284. doi: 10.5578/tt.68967.

Airway stents: a retrospective evaluation of indications, results and complications in our 10-year experience

Mehmet Akif Özgül [1], Erdoğan Çetinkaya [1], Ekrem Cengiz Seyhan [1], Demet Turan [1], Efsun Gonca Uğur Chousein [1], Güler Özgül [2], Deniz Doğan [3]

Introduction: Tracheobronchial stents (TBS) are the principal modalities in the management of central airway obstruction with intrinsic tracheobronchial pathology and extrinsic airway compression. The aim of the study is to assess the indications, surveillance management, complications, and long-term outcomes of the TBS managed by rigid bronchoscopy (RB) in our 10-year experience.

Materials and methods: The files of all patients who underwent stenting in two centers from November 2008 to September 2018 were reviewed for background data, type of disease, and indication for the placement of stents, symptoms, treatment, complications and outcome.

Result: 305 patients were stented with 342 TBS. TBS were placed in both malignant (n= 223) and benign airway diseases (n= 82). The median length of stent stay was 88 (34-280) days in patients with malignancies and 775 (228-2085) days in benign diseases. There was no stent-related mortality. Mucostasis (19%) and granulation tissue formation (17%) were the most common stentrelated complications. Benign nature of the disease, tumors metastatic to tracheobronchial tree, lenght of stent stay, and shape of stent were associated with the development of complications.

Conclusions: TBS offer a safe and effective therapy for patients with both benign and malign tracheobronchial pathologies.

Received: 30 January 2024 | Accepted: 16 May 2024
DOI: 10.1111/resp.14764

CLINICAL PRACTICE GUIDELINES

Official Journal of the Asian Pacific Society of Respirology
Respirology
APSR
WILEY

World Association for Bronchology and Interventional Pulmonology (WABIP) guidelines on airway stenting for malignant central airway obstruction

Udit Chaddha[1] | Abhinav Agrawal[2] | Jonathan Kurman[3] | Rosamaria Ortiz-Comino[4] | Herve Dutau[5] | Lutz Freitag[6] | Rocco Trisolini[7] | Christophe Dooms[8] | Lina Zuccatosta[9] | Stefano Gasparini[10] | Felix Herth[11] | Hideo Saka[12] | Pyng Lee[13] | David Fielding[14] | Masahide Oki[15] | Antoni Rosell[16] | Septimiu Murgu[17]

Randomized Controlled Trial > Respiration. 2020;99(4):344-352. doi: 10.1159/000506601. Epub 2020 Mar 26.

Impact of Silicone Stent Placement in Symptomatic Airway Obstruction due to Non-Small Cell Lung Cancer - A French Multicenter Randomized Controlled Study: The SPOC Trial

Hervé Dutau[1], Fabrice Di Palma[2], Yoann Thibout[3], Michel Febvre[4], Laurent Cellerin[5], Frédérique Naudin[5], Christophe Hermant[6], Hervé Vallerand[7], Samy Lachkar[8],

Background: Therapeutic bronchoscopy (TB) is an accepted strategy for the symptomatic management of central airway malignant obstruction. Stent insertion is recommended in case of extrinsic compression, but its value in preventing airway re-obstruction after endobronchial treatment without extrinsic compression is unknown.

Objective: Silicone stent Placement in symptomatic airway Obstruction due to non-small cell lung Cancer (SPOC) is the first randomized controlled trial investigating the potential benefit of silicone stent insertion after successful TB in symptomatic malignant airway obstruction without extrinsic compression.

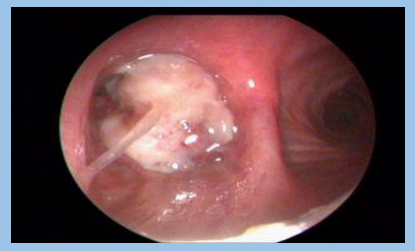
Method: We planned an inclusion of 170 patients in each group (stent or no stent) over a period of 3 years with 1-year follow-up. The 1-year survival rate without symptomatic local recurrence was the main endpoint. Recurrence rate, survival, quality of life, and stent tolerance were secondary endpoints. During 1-year follow-up, clinical events were monitored by flexible bronchoscopies and were evaluated by an independent expert committee.

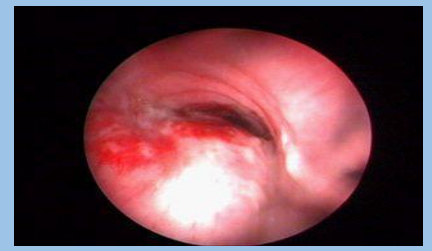
Results: Seventy-eight patients (mean age 65 years) were randomized into 2 arms: stents (n = 40) or no stents (n = 38) after TB. Consequently, our main endpoint could not be statistically answered. Improvement of dyspnea symptoms is noticeable in each group but lasts longer in the stent group. Stents do not change the survival curve but reduce unattended bronchoscopies. In the no stent group, 19 new TB were performed with 16 stents inserted contrasting with 10 rigid bronchoscopies and 3 stents placed in the stent group. In a subgroup analysis according to the oncologic management protocol following TB (first-line treatment and other lines or palliation), the beneficial effect of stenting on obstruction recurrence was highly significant (p < 0.002), but was not observed

MALİNG HAVA YOLU OBS

ACİL
RİJİT

ACİL DEĞİL
FOB YA DA RİJİT





ABLATİF TEKNİKLER VE MEKANİK REZEKSİYON

STENT

POSTENTUBASYON VE POSTTRAKEOSTOMİ TRAKEAL STENOZ

- **Entübe hastaların %16-21 fakat %1 hasta semptomatik**

Postentübasyon oluşum yeri

- **Subglotik alan %20**
- **Üst üçte birlik bölüm %60**
- **Orta bölüm %12**
- **Alt bölüm %5**

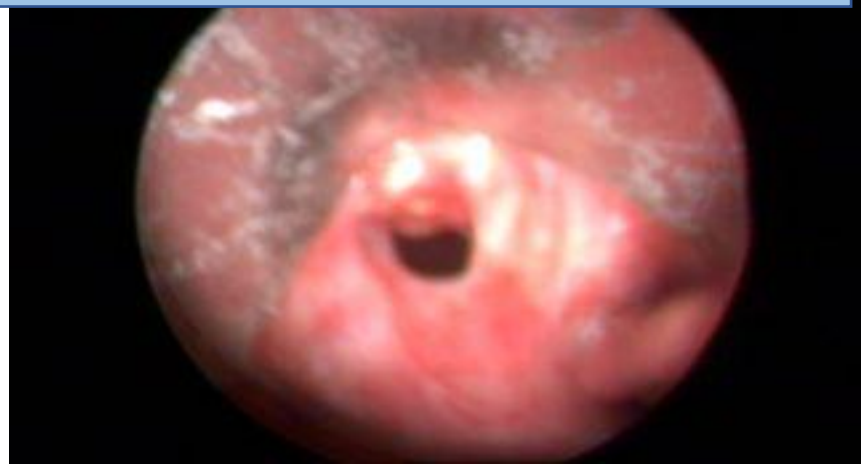
Posttrakeostomi

- **Stoma alanı**
- **Cuff bölgesi**

STENOZ MORFOLOJİK ÖZELLİKLERİ

- Granulasyon dokusu
- Web like stenoz
- Kompleks tip
- A şekilli stenoz

KISA SEGMENT
BRONKOSKOPİK TEDAVİ



UZUN SEGMENT
ACİL BRONKOSKOPİK TEDAVİ
CERRAHİ TEDAVİ

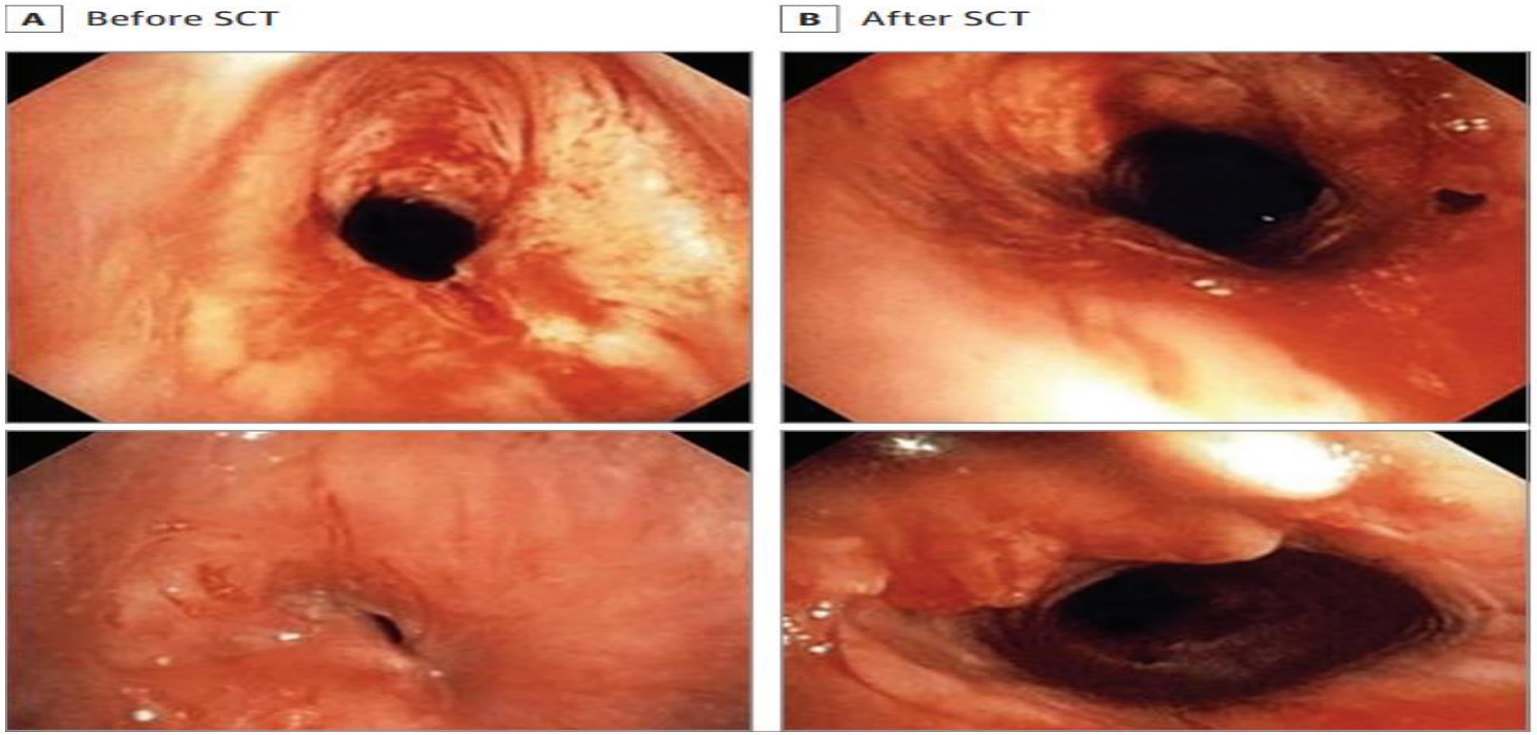
TEDAVİ

Bronkoskopik tedavi

- Dilatasyon
- Steroid intralezyoner
- Mitomisin C atuşmanı
- Sıcak yöntemler
  - APC
  - Laser
  - Koter
- Soğuk yöntemler
  - Cryoterapi
  - Cryosprey
- Brakiterapi

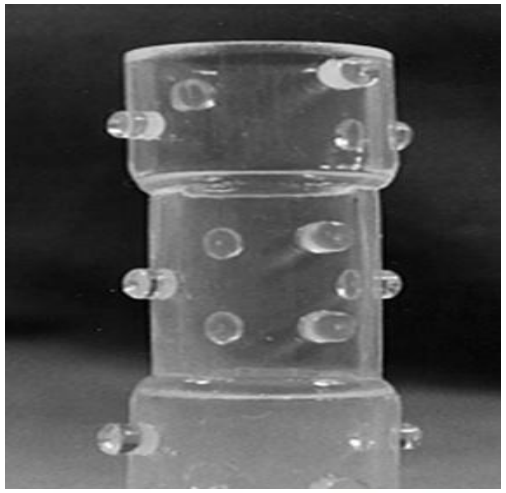
Table 6. Primary and Secondary Outcomes

Outcomes	Corticosteroid (50 Patients)	Placebo (55 Patients)	*p* Value
Days between bronchoscopies	52.3	30.6	0.115
Number of patients who finally underwent airway resection	28 (56%)	40 (72.7%)	0.102
Length of resected airway, mm	38.3	43.6	0.044



POST-ENTÜBASYON/TRAKEOSTOMİ TRAKEAL STENOZ

- **Stent**
  - Stenotik slikon stent
  - Montgomery T tüp
  - Eksternal fiksasyon
  - 3D stent
  - İlaçlı stent



- İnoperabl olgularda palyasyon amaçlı
- İnoperabl olgularda küratif amaçlı
- Küratif cerrahiye kadar geçen dönemde
  - 6-18 ay stent kalış zamanı
  - Kartilaj rejenerasyon zamanlaması ve/veya nüks belirsiz

*Silicone stents, the rigid bronchoscope, and the standard of care in central airway stenosis,Hervé Dutau,Fabien MaldonadoSophie LaroumagnePhilippe Astoul, Current Respiratory Care Reports, Mar 2012

Long-term efficacy and safety of the Dumon stent for benign tracheal stenosis: a meta-analysis

Di-Fei Chen, Yu Chen, Chang-Hao Zhong, Xiao-Bo Chen, Shi-Yue Li

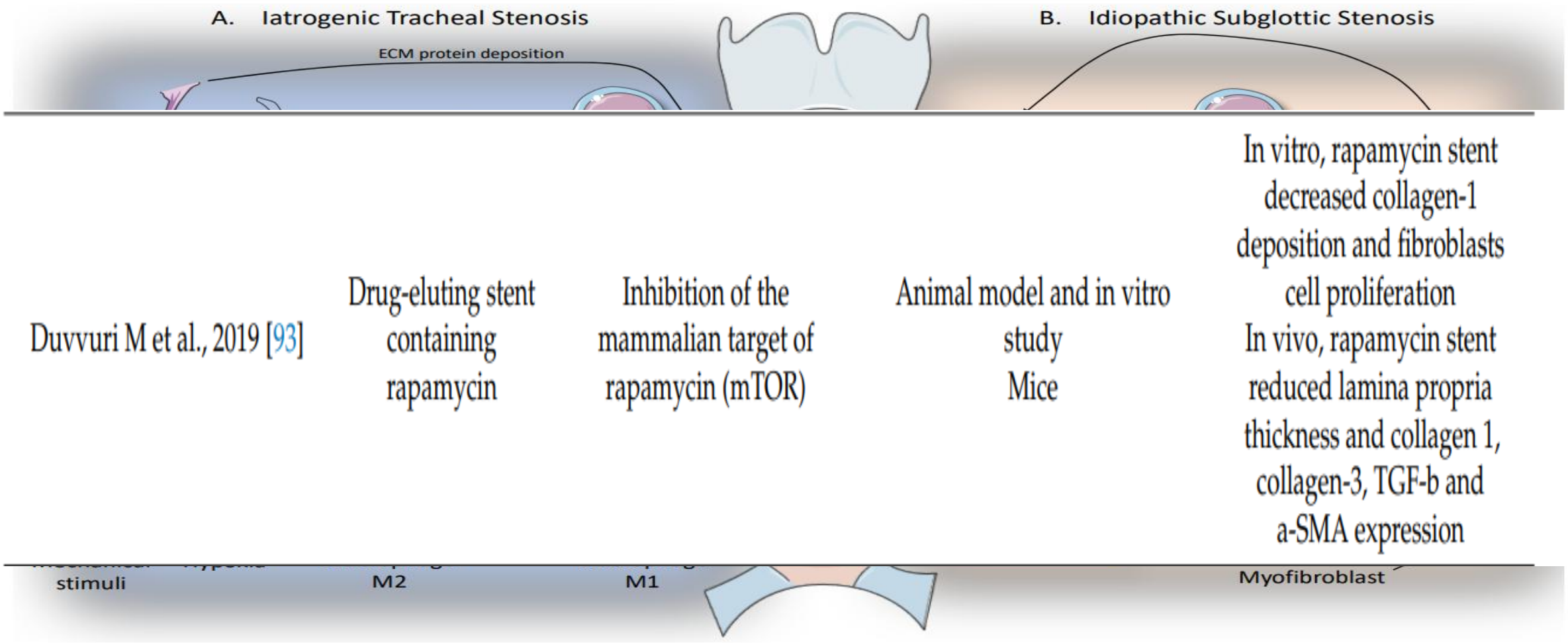
© Journal of Thoracic Disease. All rights reserved.

J Thorac Dis 2021;13(1):82-91 | http://dx.doi.org/10.21037/jtd-20-2327

STENT
%30-%35 KÜR

Postentübasyon/posttrakeostomi trakeal stenozlarda 8 yıllık tecrübemiz

Mehmet Akif ÖZGÜL[1], Şule GÜL[1], Erdoğan ÇETİNKAYA[1], Demet TURAN[1], Gamze KIRKIL[2], Efsun Gonca UĞUR CHOUSEIN[1], Elif TANRIVERDİ[1], Güler ÖZGÜL[3]



Duvvuri M et al., 2019 [93]	Drug-eluting stent containing rapamycin	Inhibition of the mammalian target of rapamycin (mTOR)	Animal model and in vitro study Mice	In vitro, rapamycin stent decreased collagen-1 deposition and fibroblasts cell proliferation In vivo, rapamycin stent reduced lamina propria thickness and collagen 1, collagen-3, TGF-b and a-SMA expression

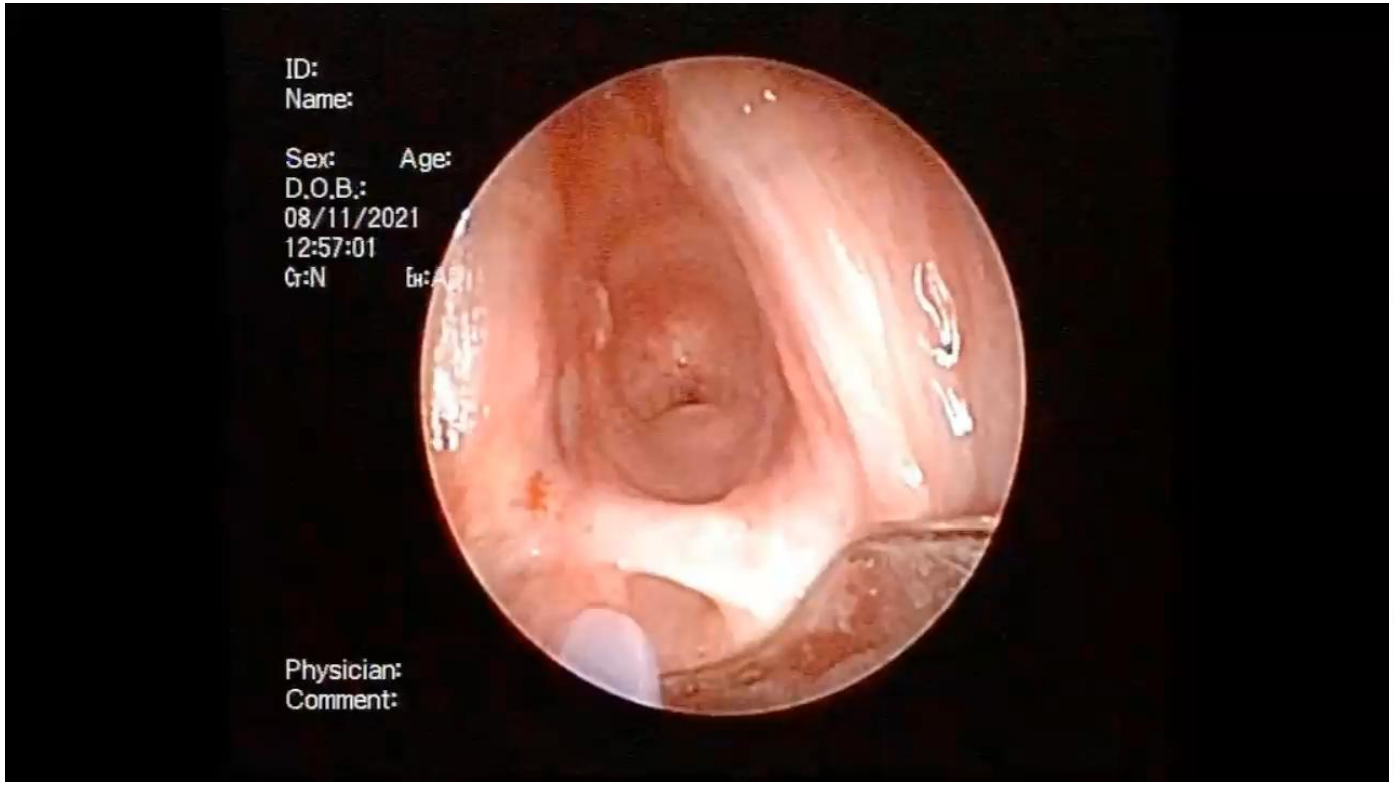
- **Eritromisin**
- **Antifibrotik (Nintenatib,pirfenidon)**

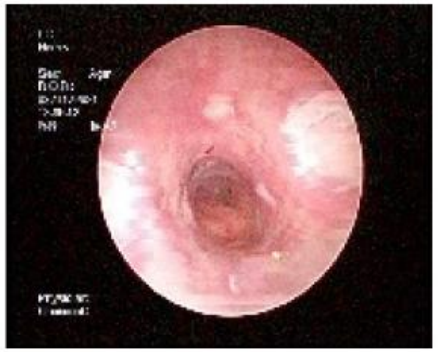
OLGU

- 57 yaşında, kadın
- Şikayeti: Nefes darlığı
- Hikayesi: Ocak 2021'de geçirdiği trafik kazası (ADTK) sonrası trakeostomi açılarak 1 ay YBÜ yatış öyküsü olan hasta o dönemden beri artararak devam eden nefes darlığı nedeni ile merkezimize yönlendirilmiş
- Özgeçmiş: HT, DM, Panik bozukluk (?)

PA AKCİĞER GRAFİSİ

OLGU





- Hastaya stent bakımı eğitimi verildikten sonra ayaktan bronkoskopi kontrolü planlanarak eksterne edildi

BENİNG TÜMÖRLER

- Kondrom
- Hamartom
- Hemanjiom
- Lipom
- Nörojenik tümörler
- Fibrom

- Tüm akciğer tümörlerinin %2 ila %5
- Mezenkimal,submukazal glandüler,epitelyal
- En sık hamartom

Endobronchial treatment of benign endobronchial neoplasms: Our 10 years of experience

Demet Turan [1], Mehmet Akif Özgül [1], Ekrem Cengiz Seyhan [1], Efsun Uğur Chousein [1], Güler Özgül [2], Erdoğan Çetinkaya [1]

JLT

Table 2. Treatment of benign endobronchial tumors and treatment response

Endobronchial tumor type	Age Mean±SD	Sex M/F	ETP	Number of treatment modalities							Treatment of respond
				APC	DL	EC	CRT	CR-E	MMC	MD	Very good/good/bad
Hamartoma (n=17)	57±16	14/3	19	8	3	8	3	4	-	4	11/5/1
Lipoma (n=8)	59±6	6/2	9	4	1	4	1	3	-	1	6/2/-
Fibroepithelial polyp (n=8)	54±17	6/2	8	2	-	6	2	3	-	2	7/1/-
Amyloidosis (n=4)	60±3	3/1	6	4	2	-	2	2	-	3	2/2/-
Chondroma (n=4)	47±21	2/2	4	2	1	1	2	-	-	1	4/-/-
Hemangioma (n=4)	54±11	2/2	6	1	4	1	1	-	-	1	4/-/-
Inflammatory pseudopolyp (n=2)	33±10	2/-	2	1	-	1	1	-	-	-	2/-/-
Papilloma (n=2)	29±7	2/-	7	4	5	-		5	6	6	-/2/-
TO (n=2)	33±10	-/2	4	2	-	-			3	-	2/-/-
Ectopic parathyroid adenoma (n=1)	54	1/-	1	-	1	-		-	-	-	-/-/1
Heterotopic thyroid adenoma (n=1)	41	1/-	1	-	1	-	1	-	-	1	1/-/-
Total	53	39/14	67	28	18	21	13	17	9	19	39/12/2

SD: Standard deviation; M: Male; F: Female; ETP: Number of endobronchial treatment procedure; APC: Argon plasma coagulation; DL: Diode laser; EC: Electrocautery; CRT: Cryotherapy; CR-E: Cryo-extraction; MMC: Mitomycin-C; MD: Mechanical debridement; TO; Tracheobronchopathia osteochondroplastica.

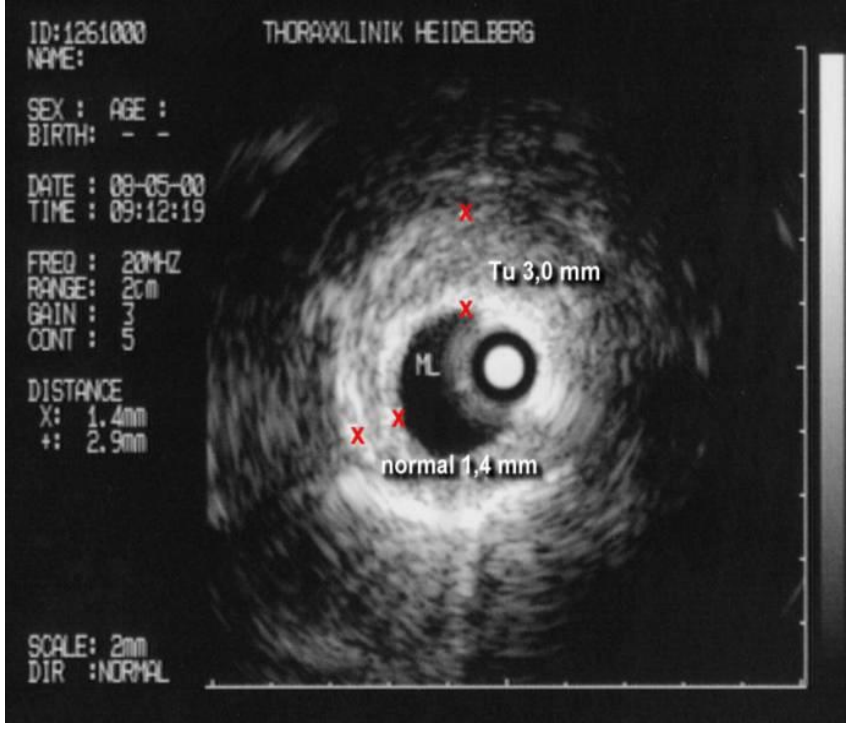
BENİNG TÜMÖRLER

Bronkoskopik tedavi

- Trakea,ana bronşlar,lob bronşları
- Pedinküllü
- Geniş tabanla duvara oturmayan
- Ekstramural invazyonu olmayan

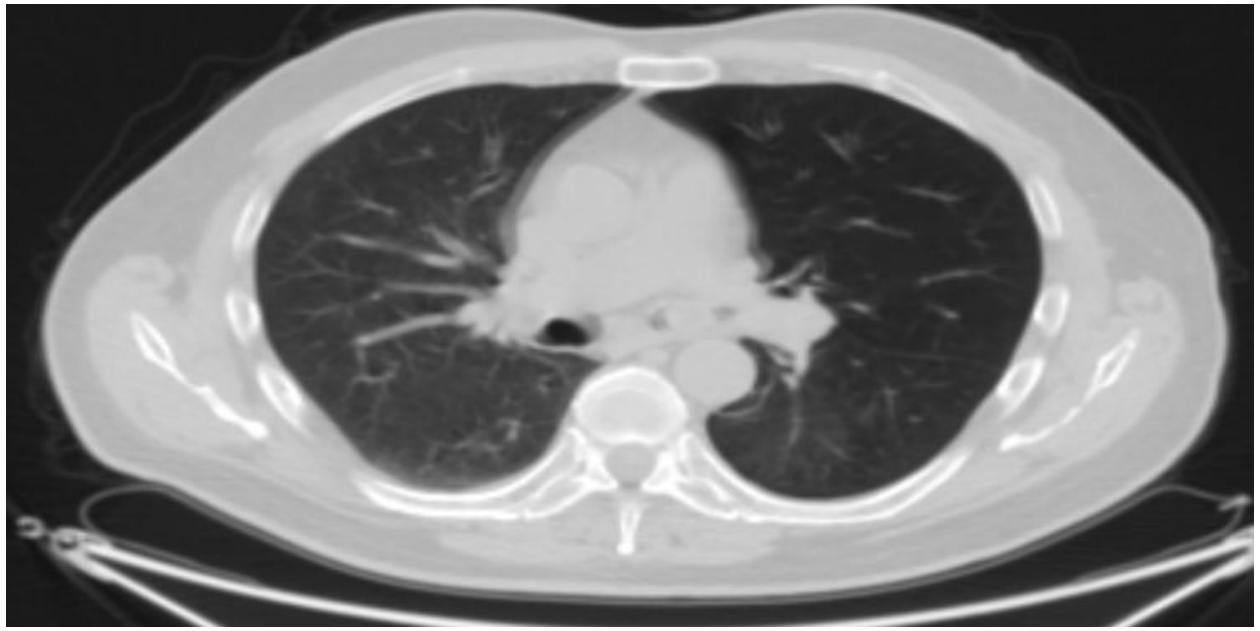
(RADİAL PROB EBUS)

- APC,Elektrokoter snare,laser mekanik rezeksiyon
- Rezidüel dokuya cryoterapi ile nüks düşük

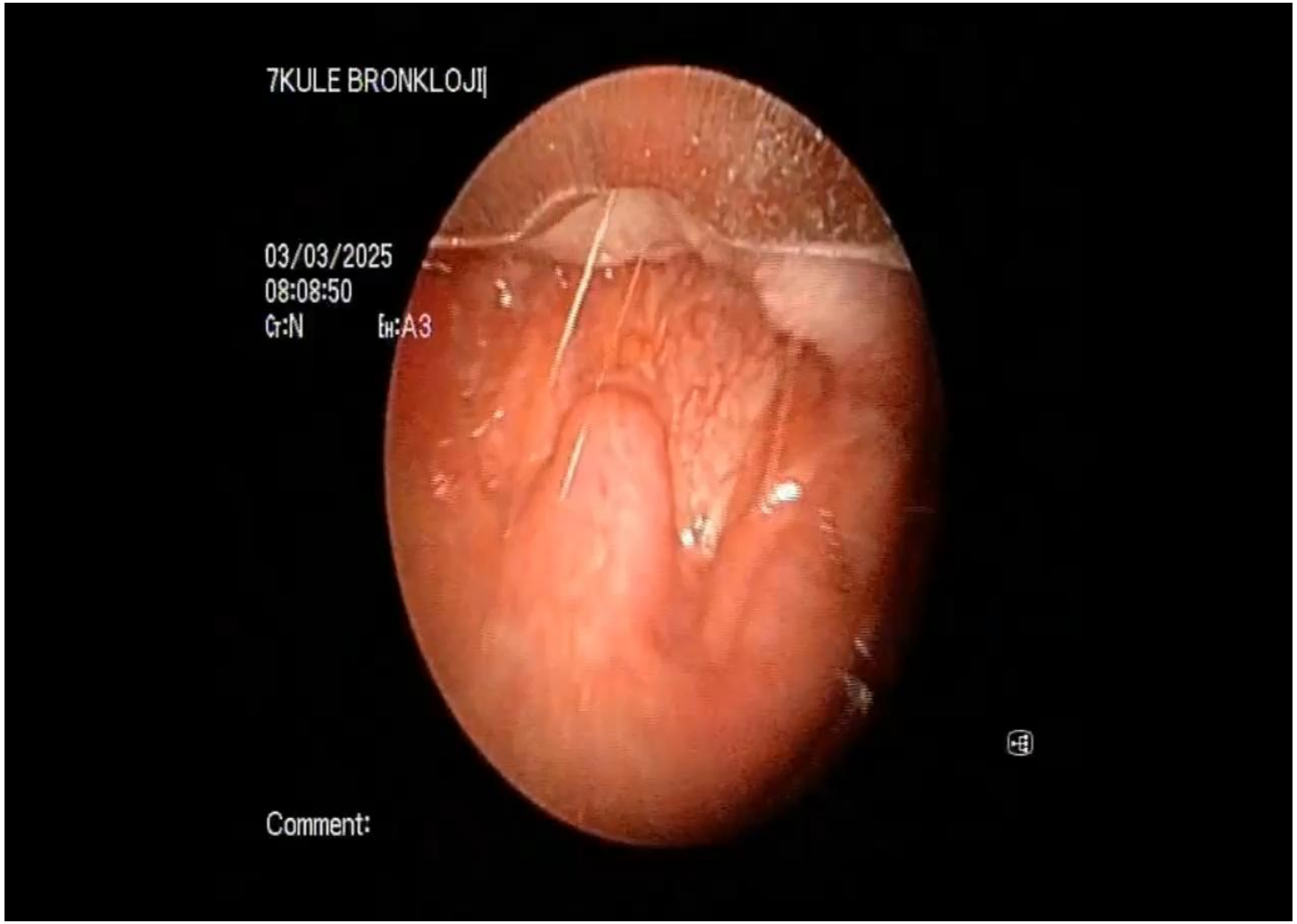


OLGU

- 60 yaş erkek hasta
- Uzun süredir öksürük balgam
- Aralık 2024 de sol akciğerde pnömoni tanısı ile yatarak tedavi almış.
- Pnömoni gerilemeyince yapılan FOB da sol ana bronş distalinde lezyon izlenmiş. Biyopsi tanısal olmamış.



- **Rijit bronkoskopi**
- **Elekrokoter snare**
- **Rezidüel alana kriyoterapi**

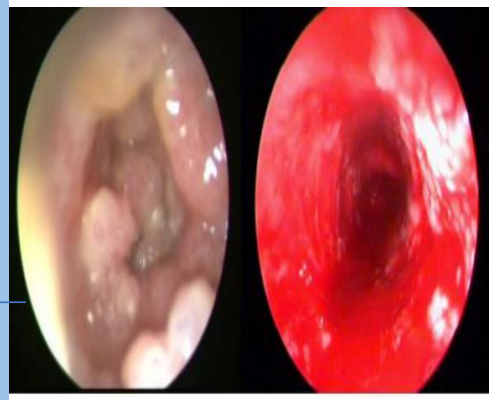


NADİR NEDENLER

- Relapsing polikondrit
- Trakeaosteokondroplastika
- Trakeal amiloidoz
- Trakeal papillom
- Polianjitisli granülom (Wegener)

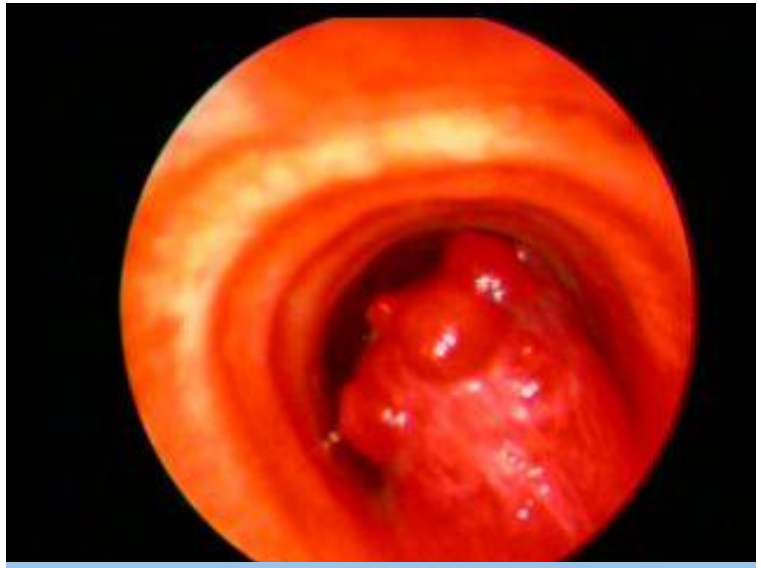
PM (-)

PM (+)

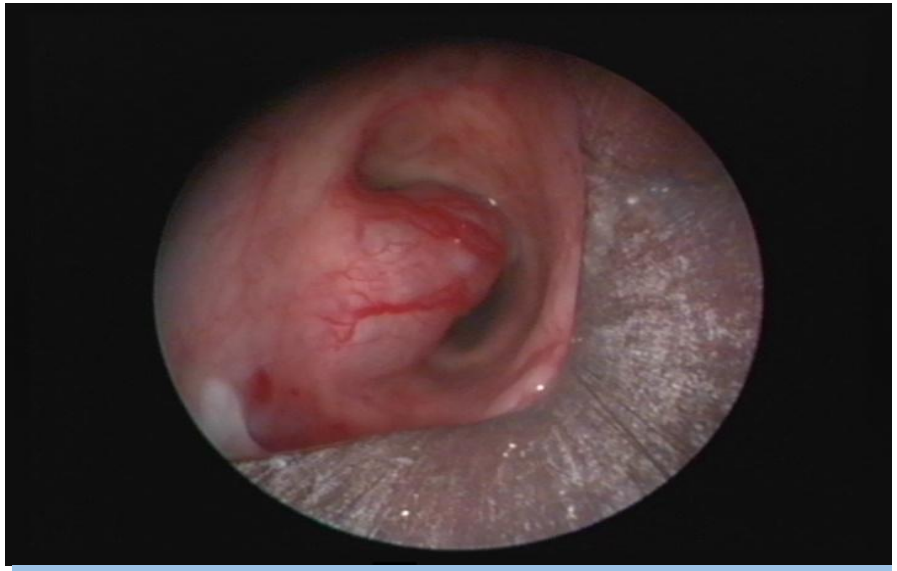


OLGULAR

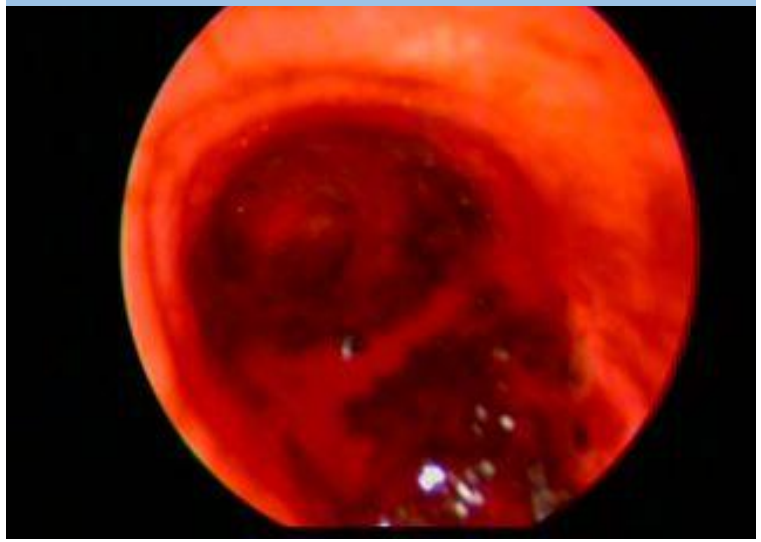
HAMARTOM

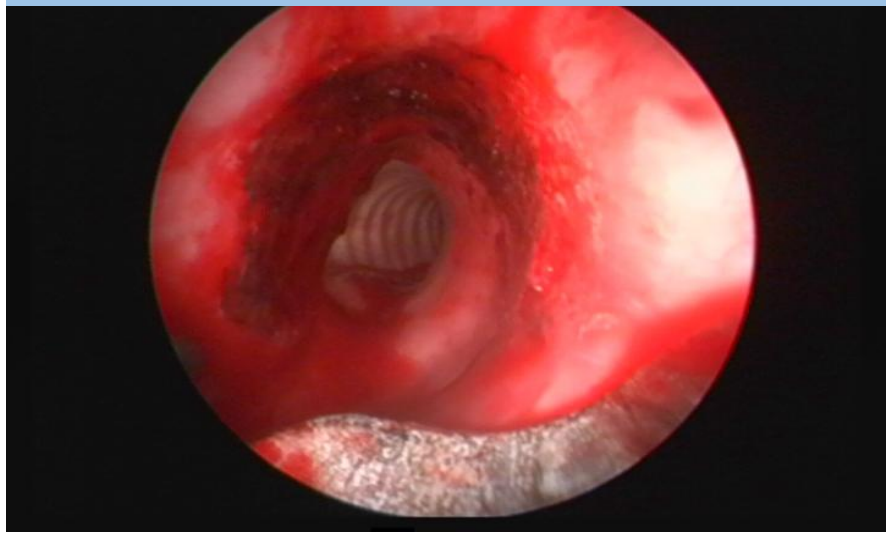


EKTOPİK PARATİROİD



EKTOPİK TİROİD





OLGU

- 69 yaşında, kadın
- Şikayeti: Nefes darlığı
- Hikayesi: Nefes darlığı şikayeti ile başvurduğu Eylül 2021'de polikliniğimizde çekilen toraks BT'de sağ akciğerde izlenen kitle nedeni ile PET BT ve FOB planlanarak hasta ayaktan takipe alınmış
- Özgeçmiş: HT

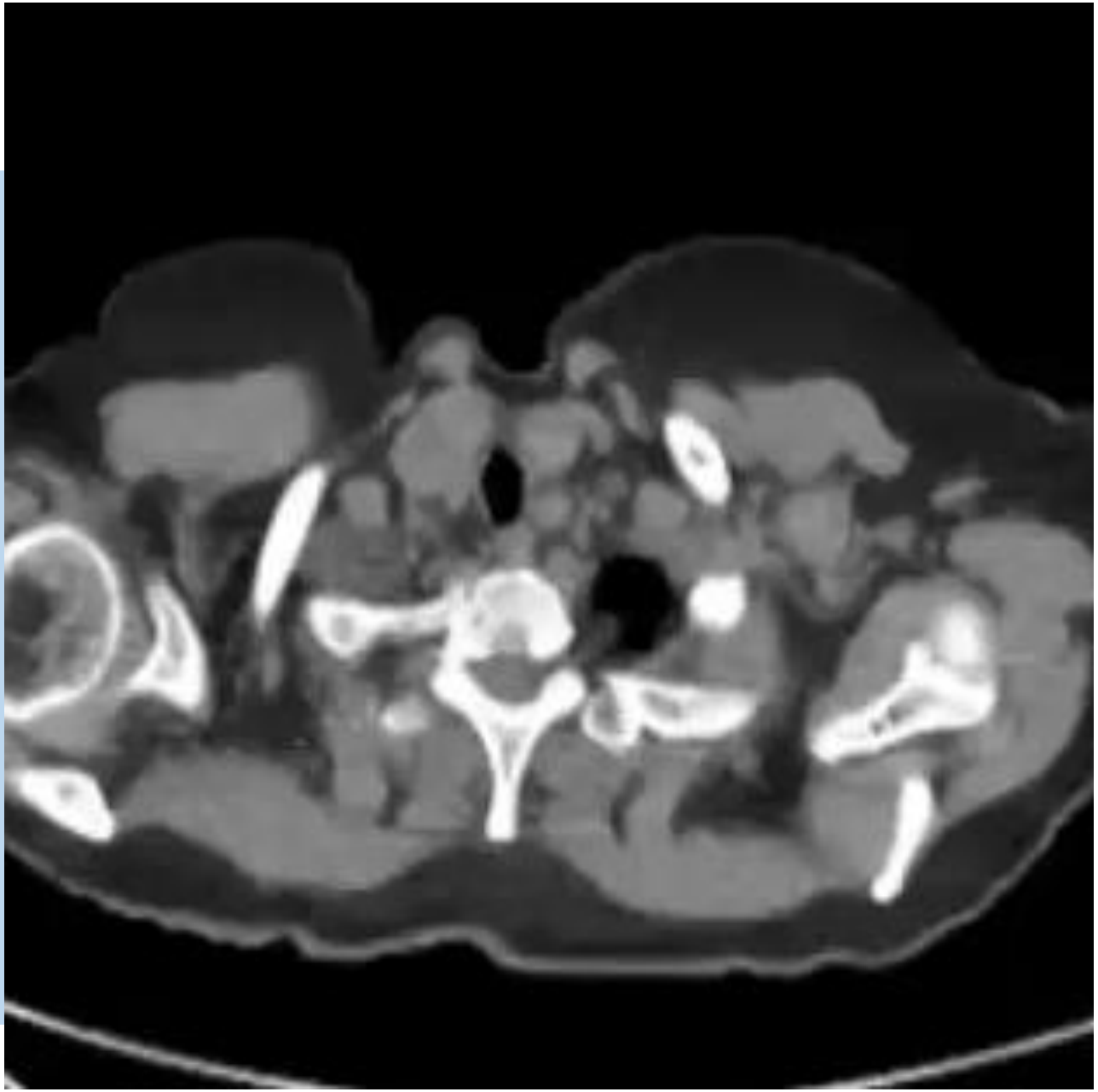
PA AKCİĞER GRAFİSİ

OLGU

- Alışkanlık: Bir özellik yok

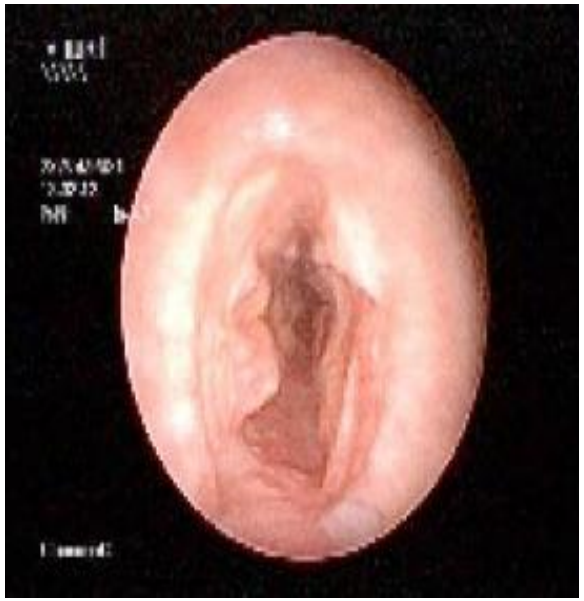
- Fizik Muayene:
  TA: 140/95 Sat: %98(oda) SDS: 16/dak
  Solunum sistemi: Stridor(+)

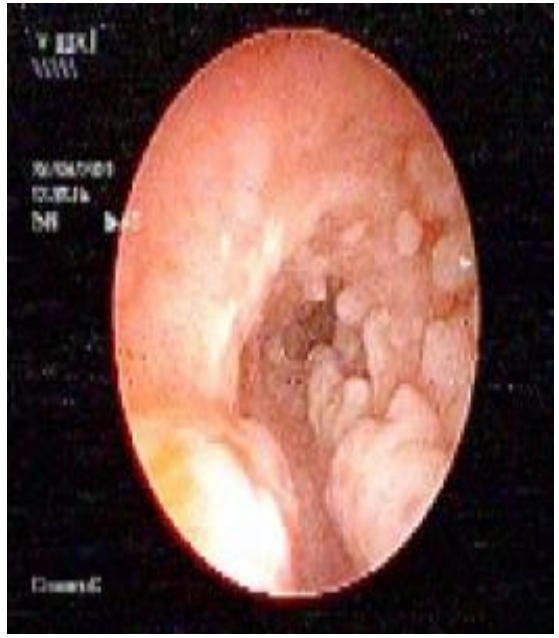
- Başvuru Laboratuar:
  Kayda değer patolojik değer yok



OLGU

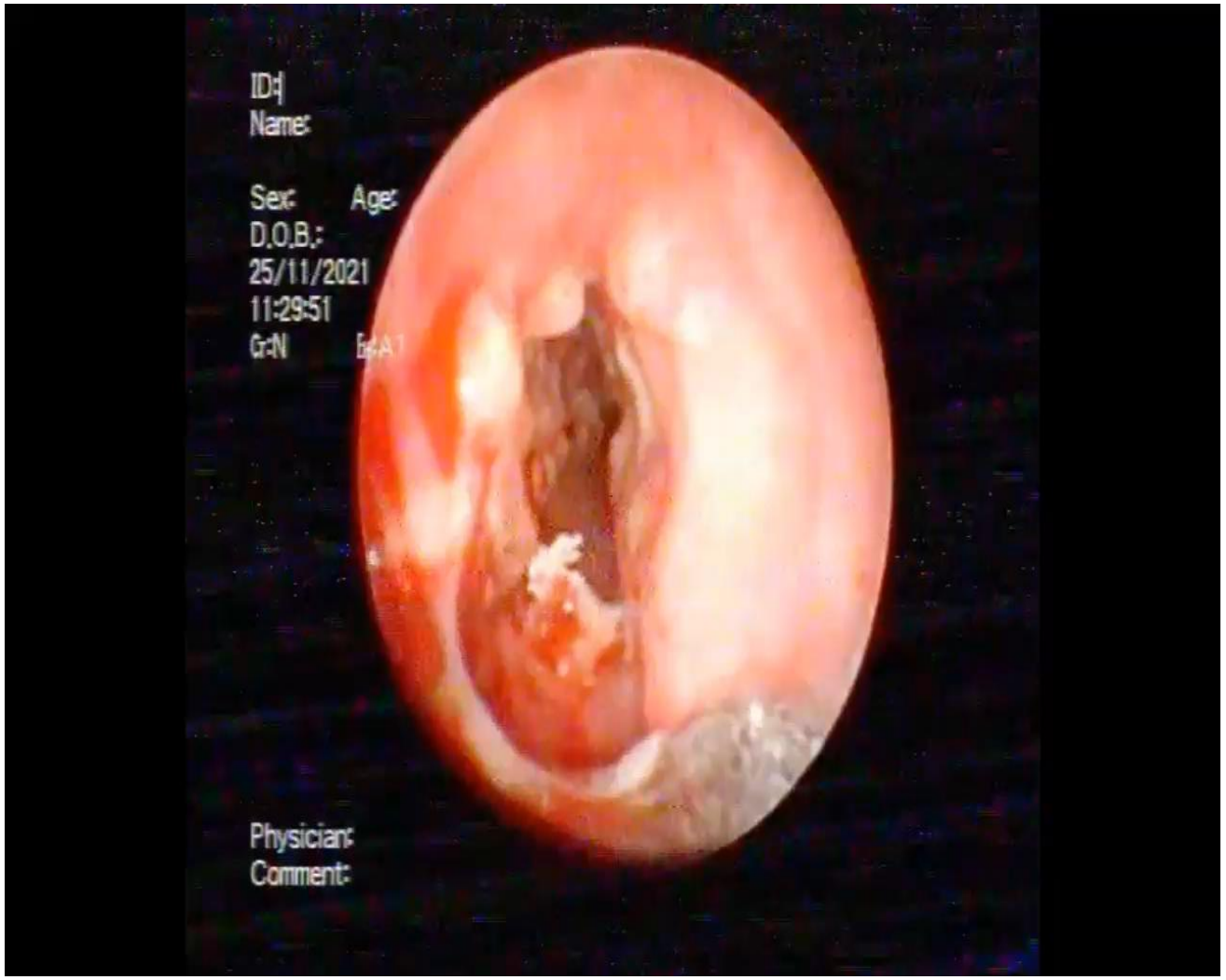
RİJİD BRONKOSKOPİ-1

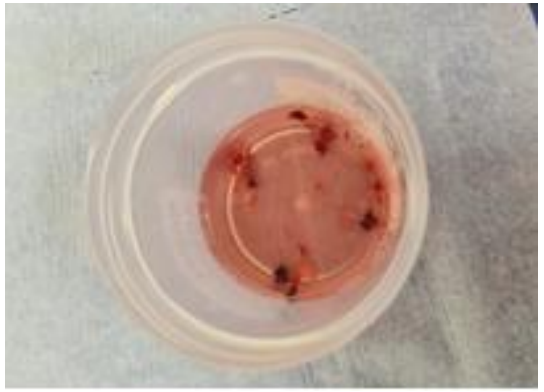


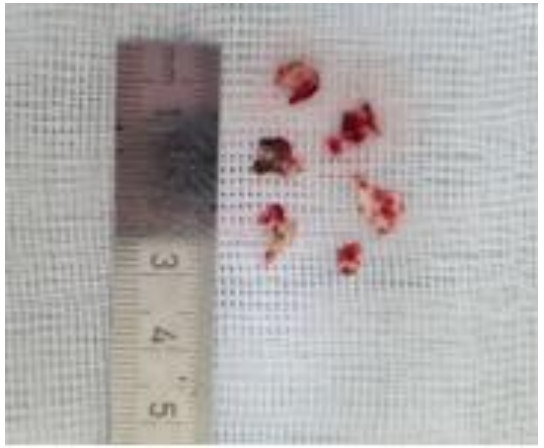


OLGU

RİJİD BRONKOSKOPİ-2







KOMPLİKASYON

- Masif hemoraji
- Endobronşial yanıklar
- Asfiksi
- Trakeal ya da bronşial perforasyon
- Trakeoözafegial fistül
- Kardiak aritmi

- Du Rand IA, Barber PV, Goldring J, Lewis RA, et al. British Thoracic Society guideline for advanced diagnostic and therapeutic flexible bronchoscopy in adults. Thorax 2011; 66 (3)

Dikkatiniz için teşekkürler…

STENT

MALIGN

→ Timing of airway stenting ?

SPOC = Role of a Silicone Prosthesis to Prevent Airway Obstruction Recurrence in Lung Cancers

European Respiratory Society Annual Congress 2013

Abstract Number: 5117
Publication Number: P3752

Abstract Group: 1.4. Interventional Pulmonology
Keyword 1: Lung cancer / Oncology **Keyword 2:** Bronchoscopy **Keyword 3:** Airway management

Title: Is a stent required after the initial resection of an obstructive lung cancer? The lessons of the SPOC trial, the first randomized study in interventional bronchoscopy

Prof. Dr Jean-Michel 33080 Vergnon vergnon@univ-st-etienne.fr MD [1,2], Dr. Yoann 33081 Thibout yoann.thibout@chu-st-etienne.fr MD [1], Dr. Herve 33082 Dutau Herve.DUTAU@ap-hm.fr MD [3], Dr. Michel 33083 Febvre michel.febvre@sat.aphp.fr MD [4], Dr. Laurent 33084 Cellerin laurent.cellerin@chu-nantes.fr MD [5], Dr. Christophe 33085 Hermant hermant.c@chu-toulouse.fr MD [6] and Dr. Fabrice 33088 Di Palma fabrice.dipalma@hotmail.fr [1]. [1] Chest Diseases and Thoracic Oncology, University Hospital, Saint Etienne, France, 42055 ; [2] LINA EA 4624, University Jean Monnet, Saint Etienne, France, 42000 ; [3] Thoracic Endoscopy Unit, Chest Diseases Department, North Hospital, University Hospital, Marseille, France, 13000 ; [4] Chest Diseases, Saint Antoine Hospital, University Hospital, Paris, France, 75000 ; [5] Chest Diseases, Laennec Hospital, University Hospital, Nantes, France, 44093 and [6] Thoracic Endoscopy Unit, Chest Diseases Department, Larrey Hospital, University Hospital, Toulouse, France, 31000 .

75 patients randomized (39 stent ; 36 no stent)

primary endpoint : 1 year survival without recurrence >50%

Recurrence rate local obstruction strongly decreased in stent arm

Survical at 1 year : no difference.

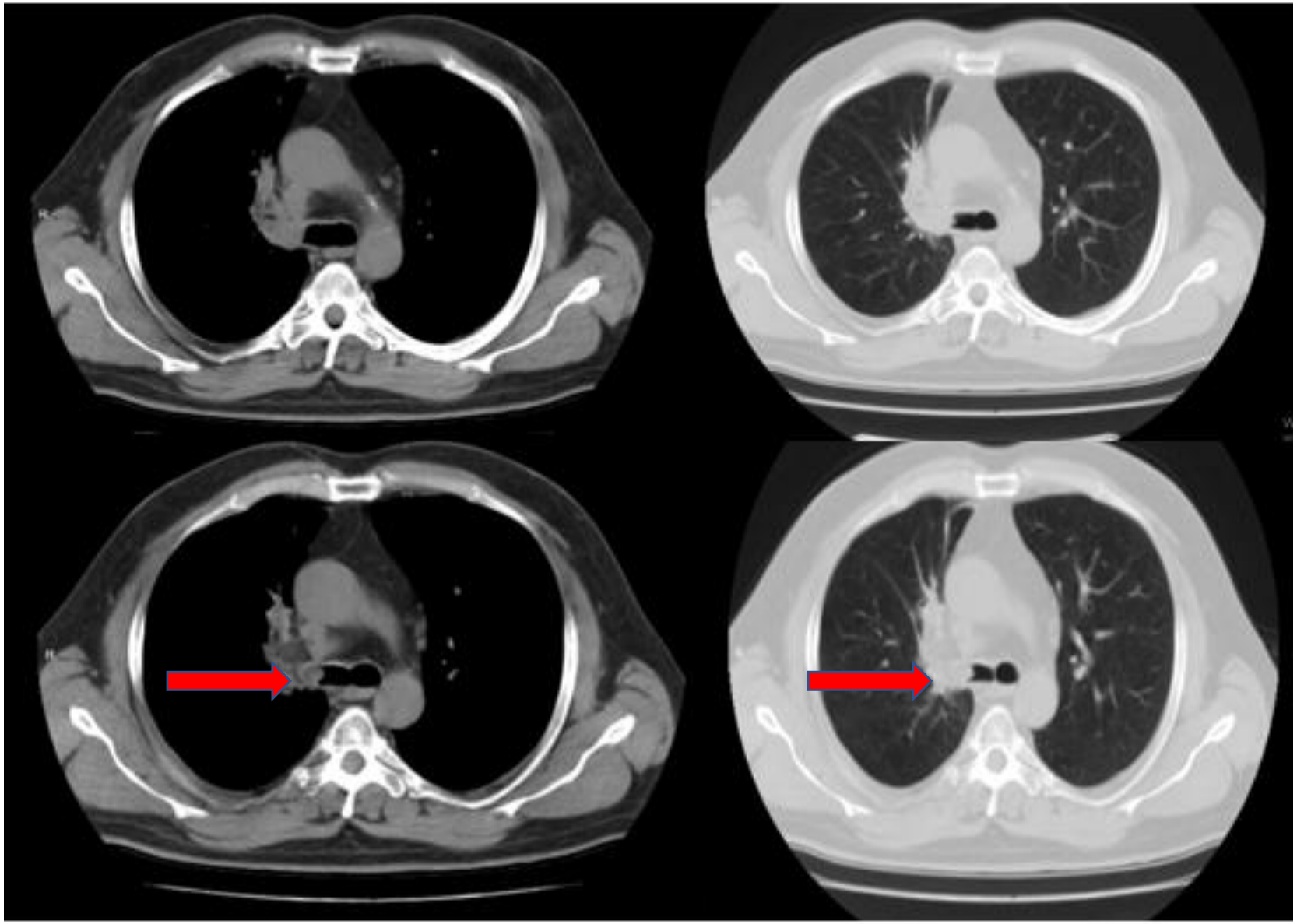
Vergnon et al. ERS Congress 2013 Oral presentation.

OLGU 5

- 61 yaşında,erkek
- Şikayeti: Öksürük, nefes darlığı, ağızdan kan gelmesi
- Hikayesi: 1 aydır nefes darlığı, öksürük, ağızdan kan gelmesi şikayeti olan hasta, çekilen Toraks BT'sinde sağ akciğerde lezyon saptanması üzerine bronkoskopi planlanmış
- Solunum sıkıntısı artması üzerine dış merkeze başvuran hasta entübe edilerek yoğun bakıma alınmış
- Özgeçmiş: HT
- Alışkanlıkları: Sigara 50 paket/yıl

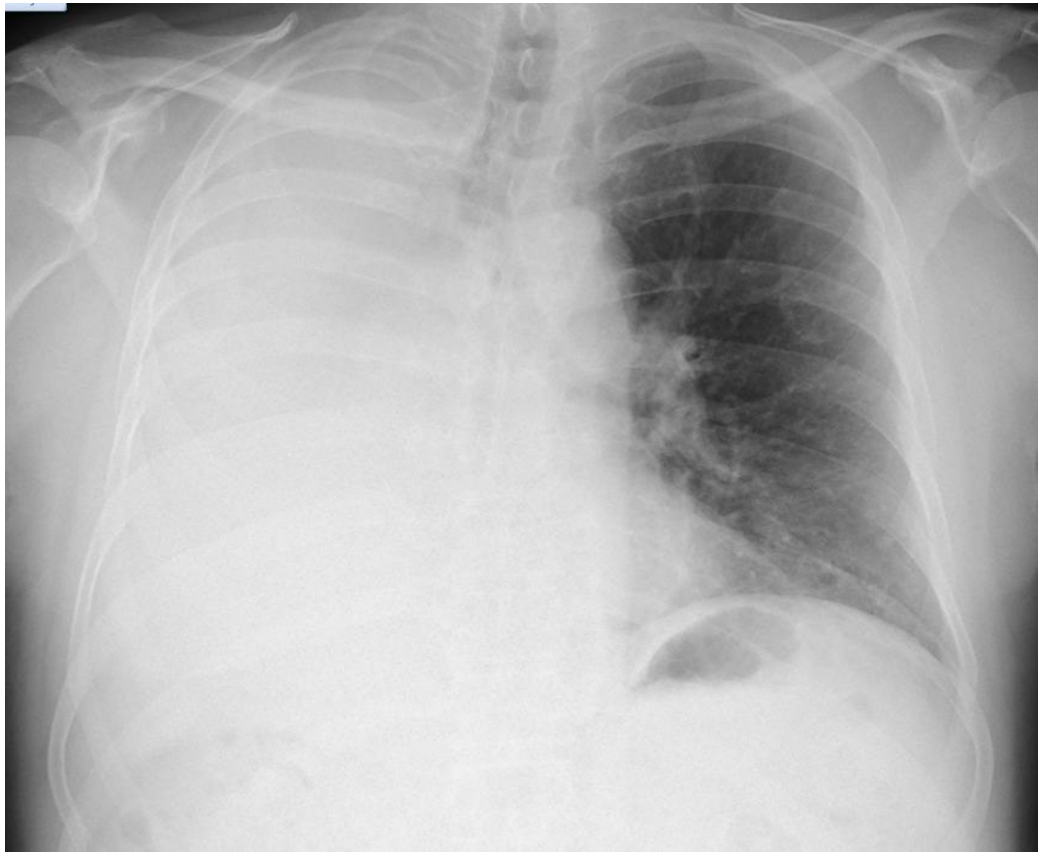
OLGU 5

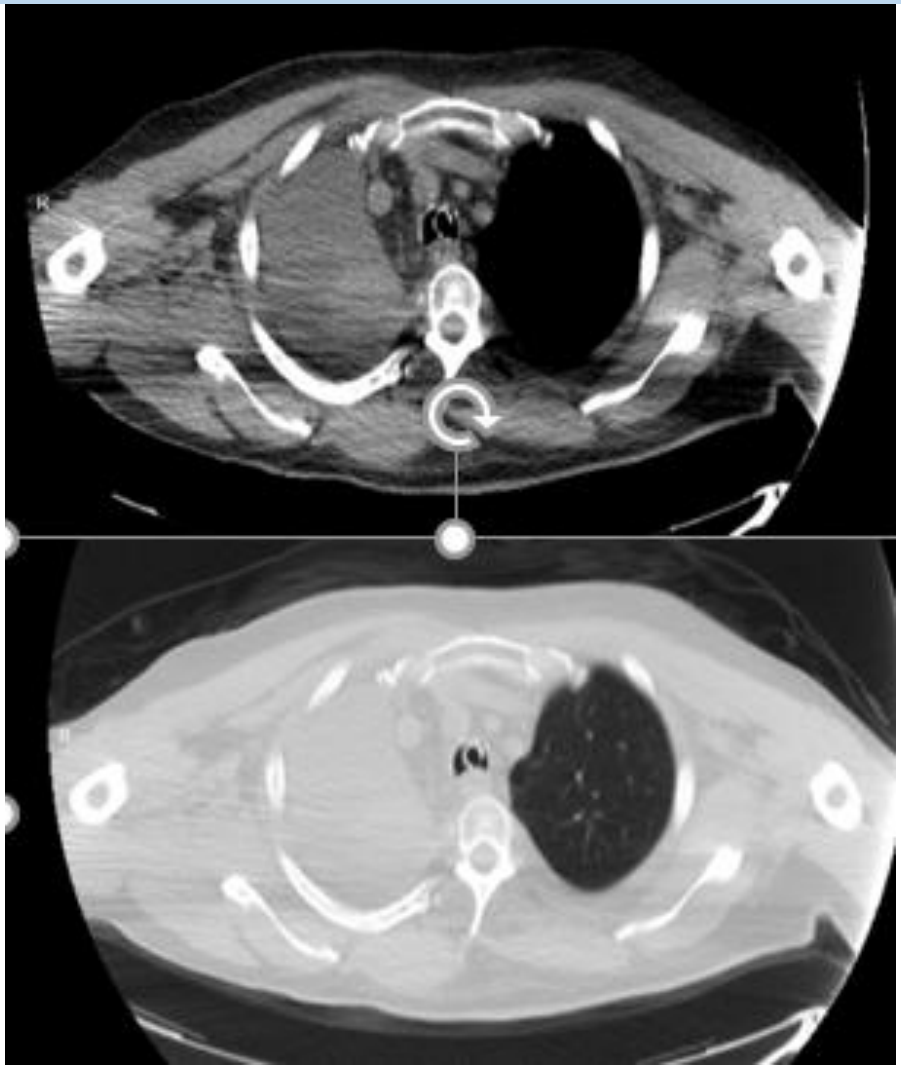
Eylül 2020 Toraks BT



OLGU 5

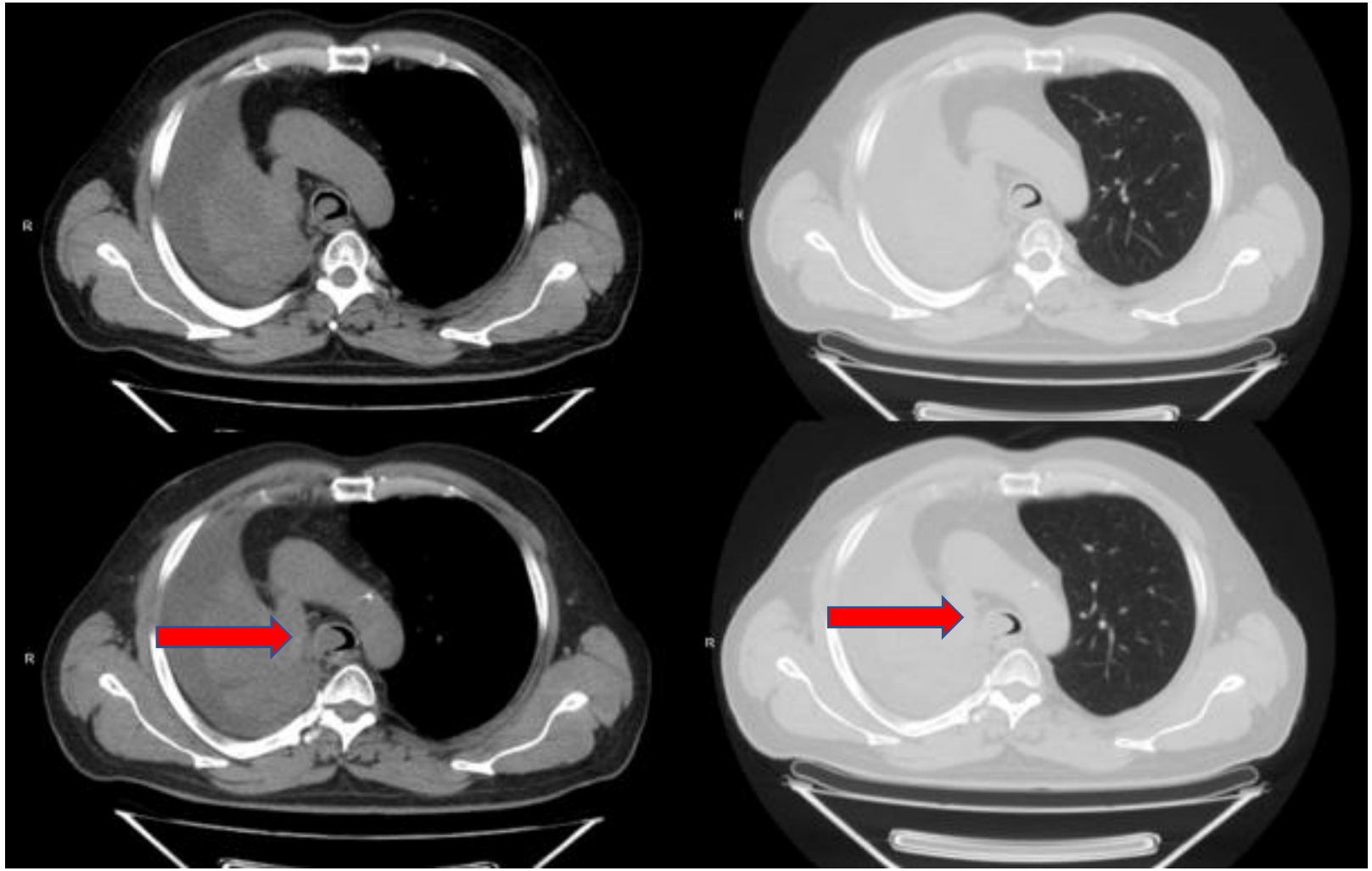
Yoğun Bakım Takibinde Çekilen PA Akciğer Grafisi ve Toraks BT (Kasım 2020)





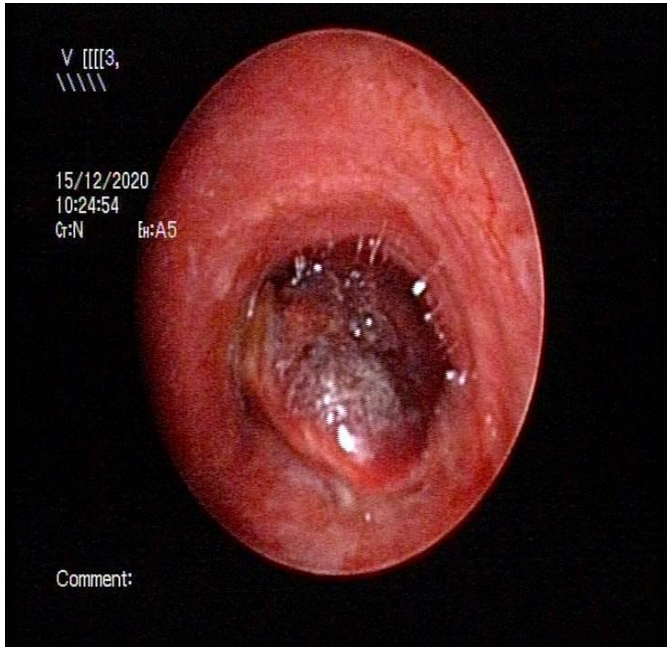
OLGU 5

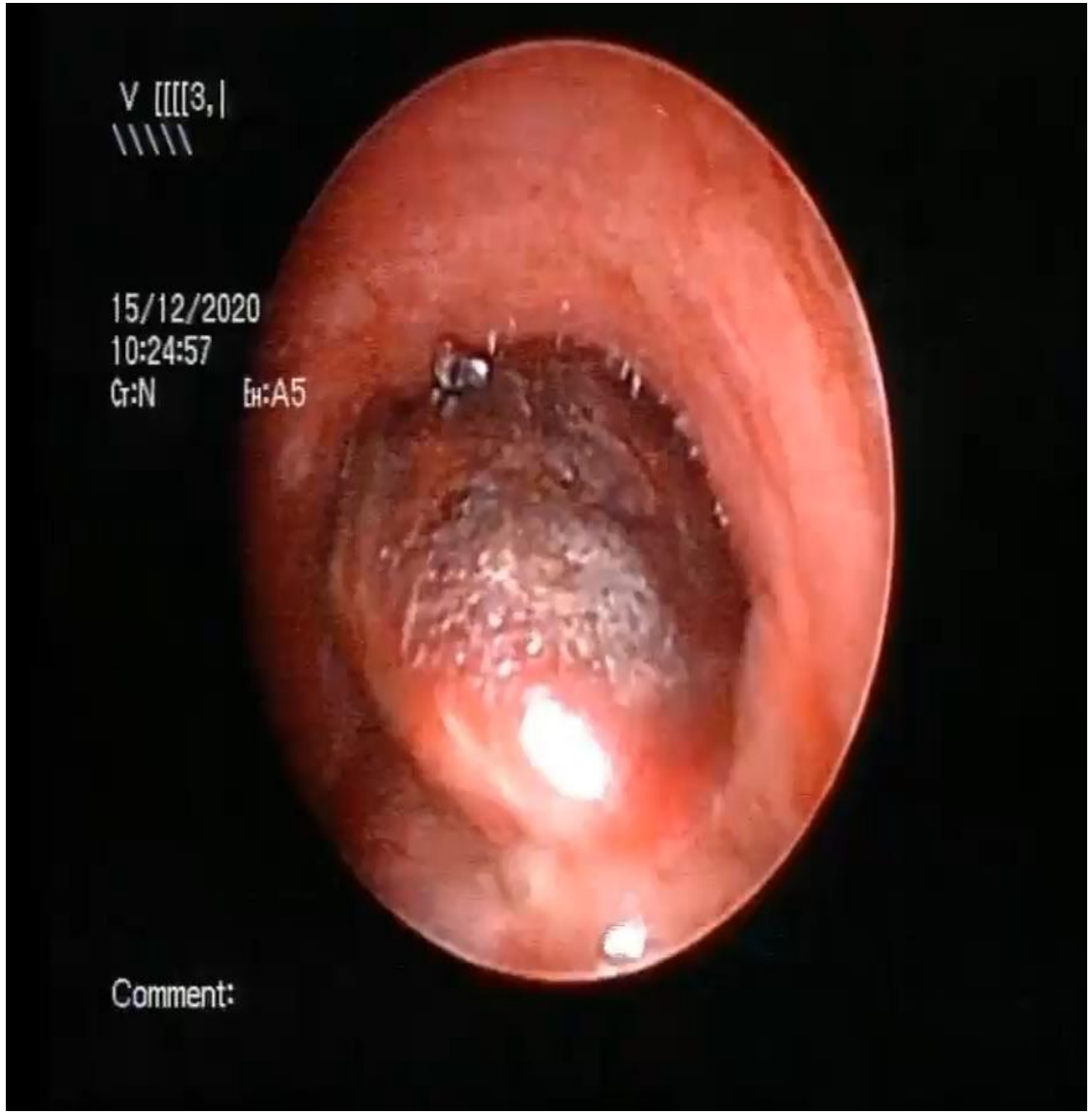
Yoğun Bakım Takibinde Çekilen PA Akciğer Grafisi ve Toraks BT (Kasım 2020)

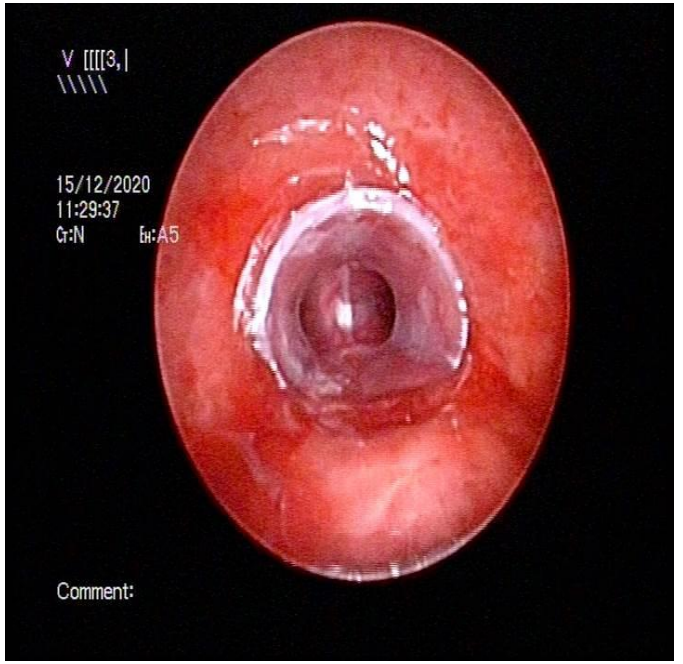


OLGU 5

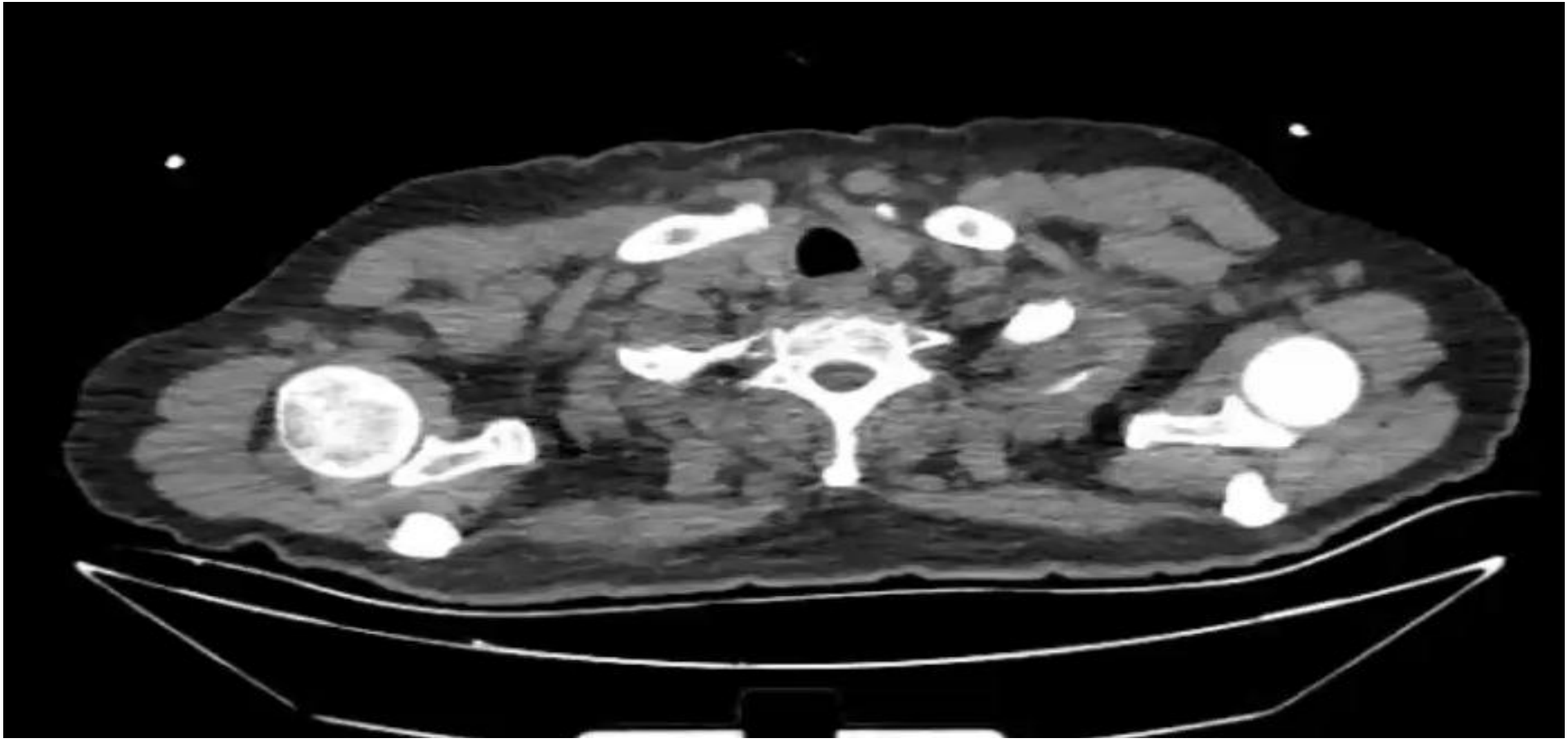
RİJİD BRONKOSKOPİ







OLGU 5



Ocak 2021 Toraks BT

OLGU 5

- **Torasentez**
- **Onkoloji takibinde KT+ RT başlandı**
- **Şubat 2021 de yüzde ve boyunda ödem , solunum sıkıntısı ile acile başvurdu**
- **Vena cava superiorda bası saptanan hastaya girişimsel radyolojide vena cava'ya stent yerleştirildi**

Gönderilen Materyal PLEVRA MAYİİ

Materyallerin Alındığı Yer PLEVRA **Materyalin Alınma Şekli :** ASPİRASYON

Klinik Ön Tanı

Akciğer Ca. KT alıyor

Makroskopi

Plevra Mayii: 4 cc hacminde prülan görünümde mayii. 2 adet lam yayıldı. PAP+ Giemsa boyandı. Hücre bloğu hazırlandı.
1BLOK/YOK

Kesit Teknikeri: Ezgi Aytekin Sitoloji Teknikeri: Arif Cemre Yücel Doküm Teknikeri: Aysun Hotan Raporlayan Tıbbi Sekreter: Sunay Sarpal

TIBBİ LABORATUVAR YORUMU

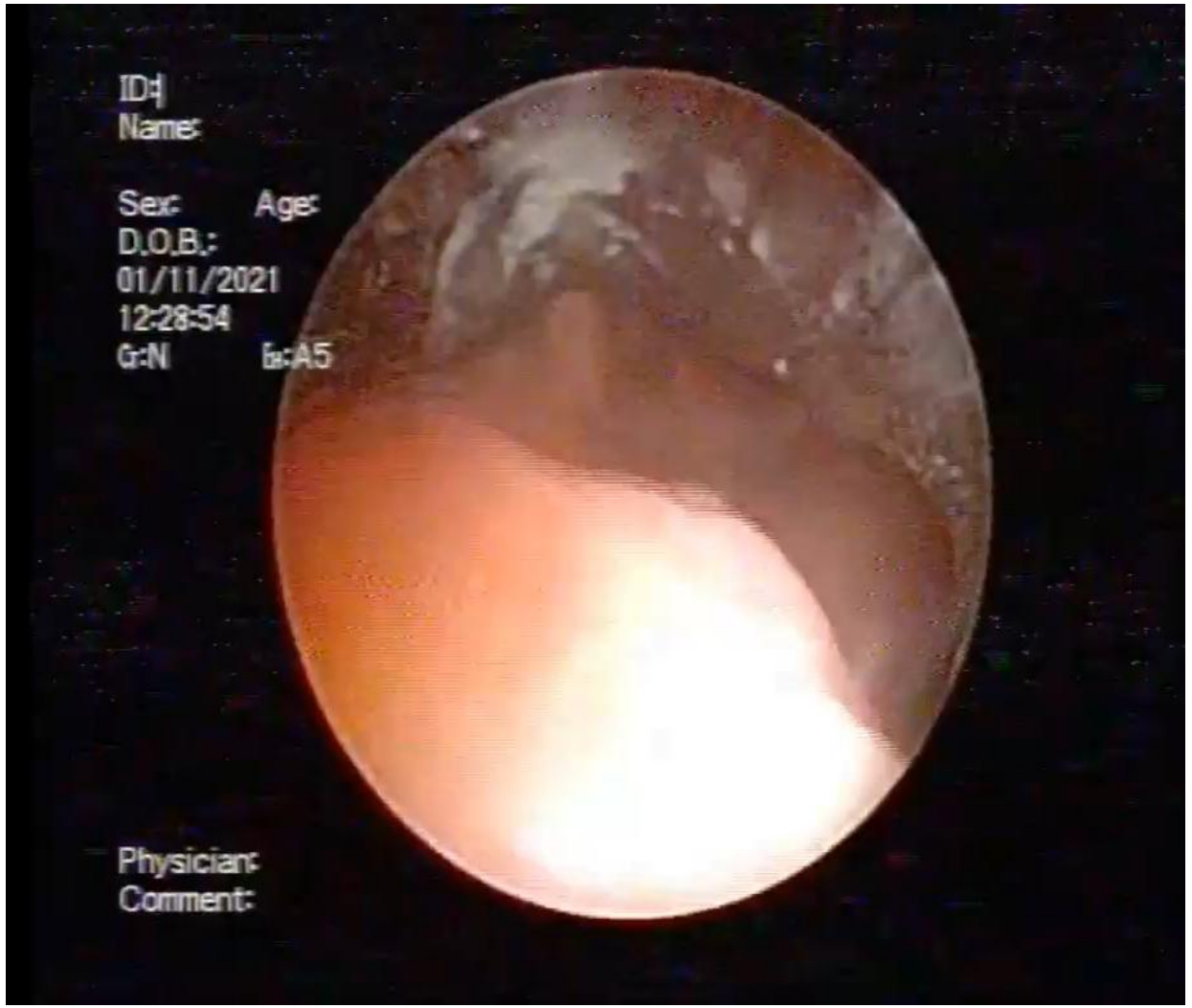
NOT: Tümöral hücre görülmedi

RAPOR ÇIKIŞ TARİHİ: 18/02/2021

Histopatalojik Tanılar / Sitopatolojik Tanılar

Plevra Aspirasyon (Yayma+ Hücre Bloğu Kesitleri): Lenfositler, polimorf nüveli lökositler

OLGU 5

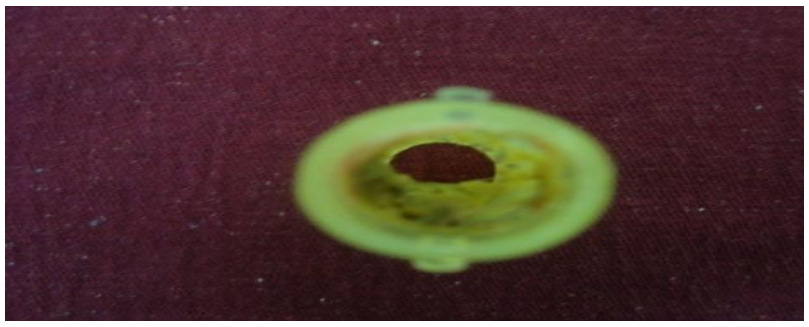


Ekim 2021 Toraks BT

STENT KOMPLİKASYON

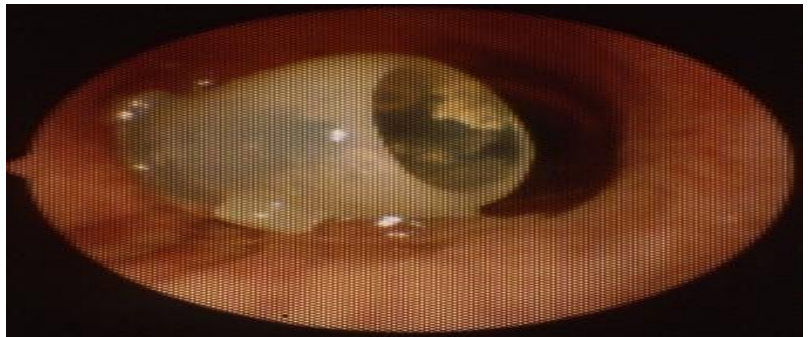
İŞLEM SIRASINDA

- Hava yolu obstrüksiyonu
- Malpozisyon
- Trakeobronşial perforasyon
- Mediastinal fistül
- Pnomotoraks



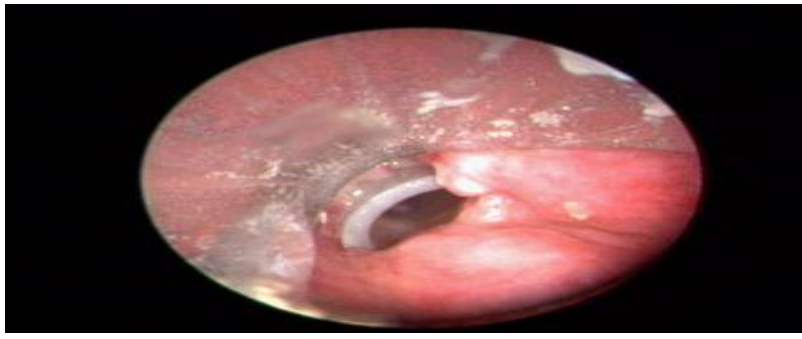
KISA DÖNEM

- Migrasyon
- Sekresyon retansiyonu
- Öksürük
- Perforasyon

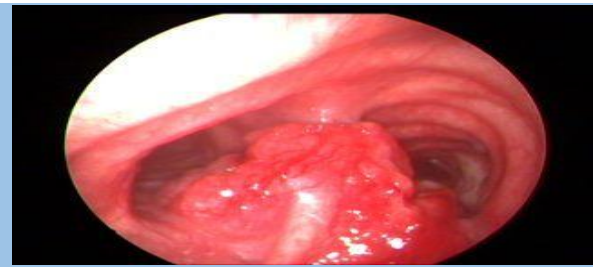


UZUN DÖNEM

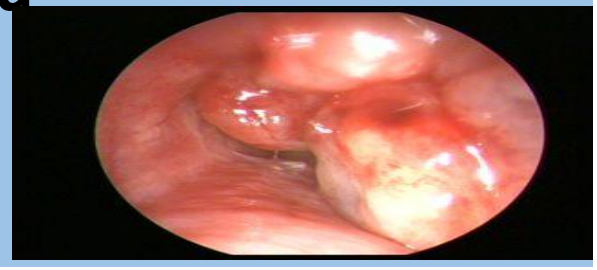
- Sekresyon retansiyonu
- Granulasyon
- Ağız kokusu
- Stent kırılması
- Solunum yolu enfeksiyonu



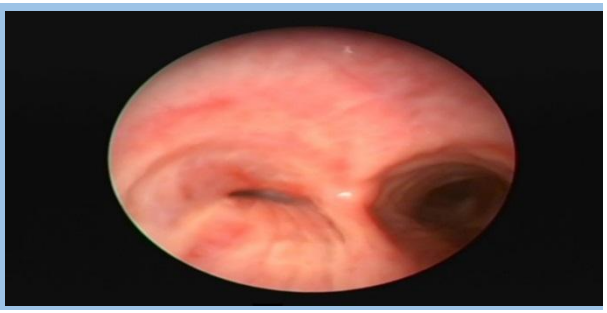
- Ana karina tutulumu



- Trakea distal veya orta hatta tutulumu



- Ana bronşlar proksimalinde stenoz



- Trakeoözafegial ya da trakeal fistül

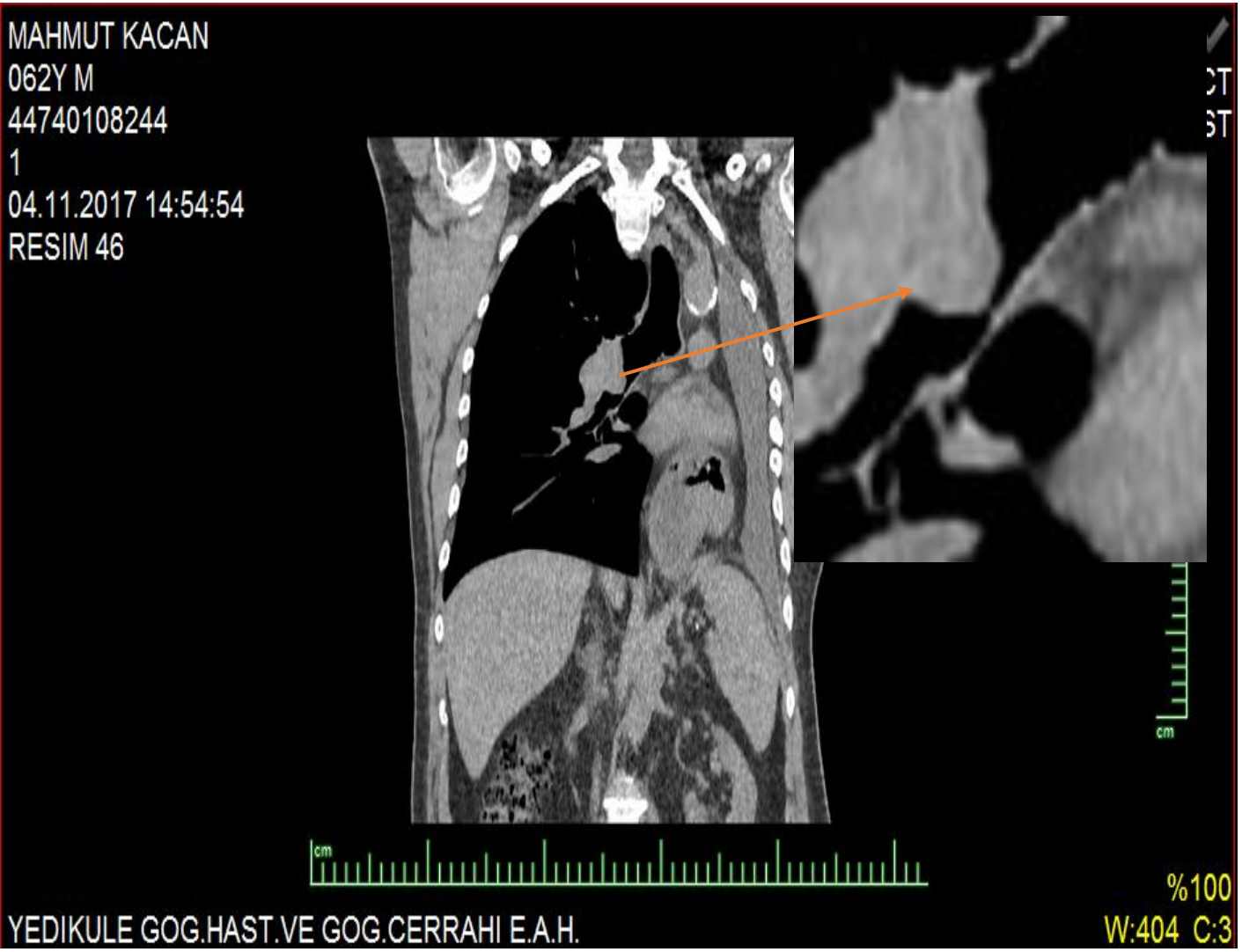
BRONŞİAL Y STENT

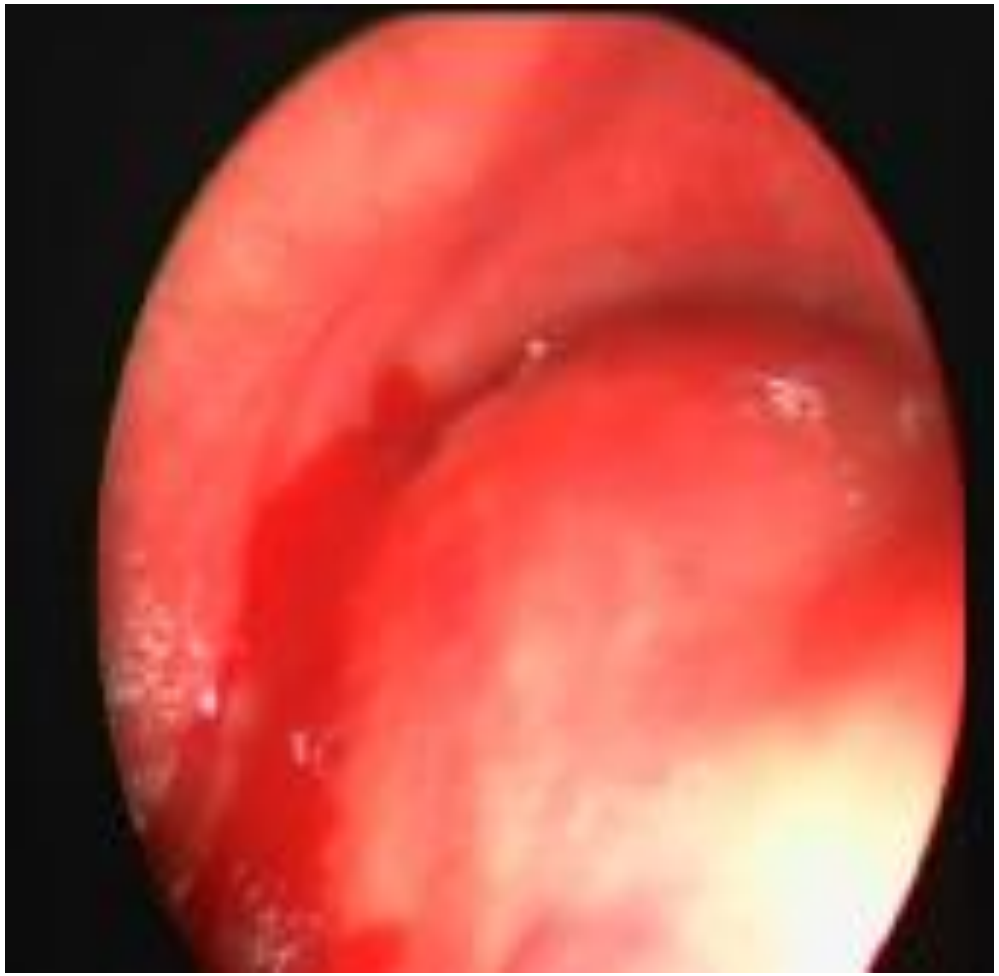
Oki stent application in different indications: Six cases.

Özgül MA, Çetinkaya E, Çörtük M, Tanrıverdi E, Yıldırım BZ, Balci MK, Issaka A, Özgül G.
Clin Respir J. 2016 Jun 22. doi: 10.1111/crj.12521

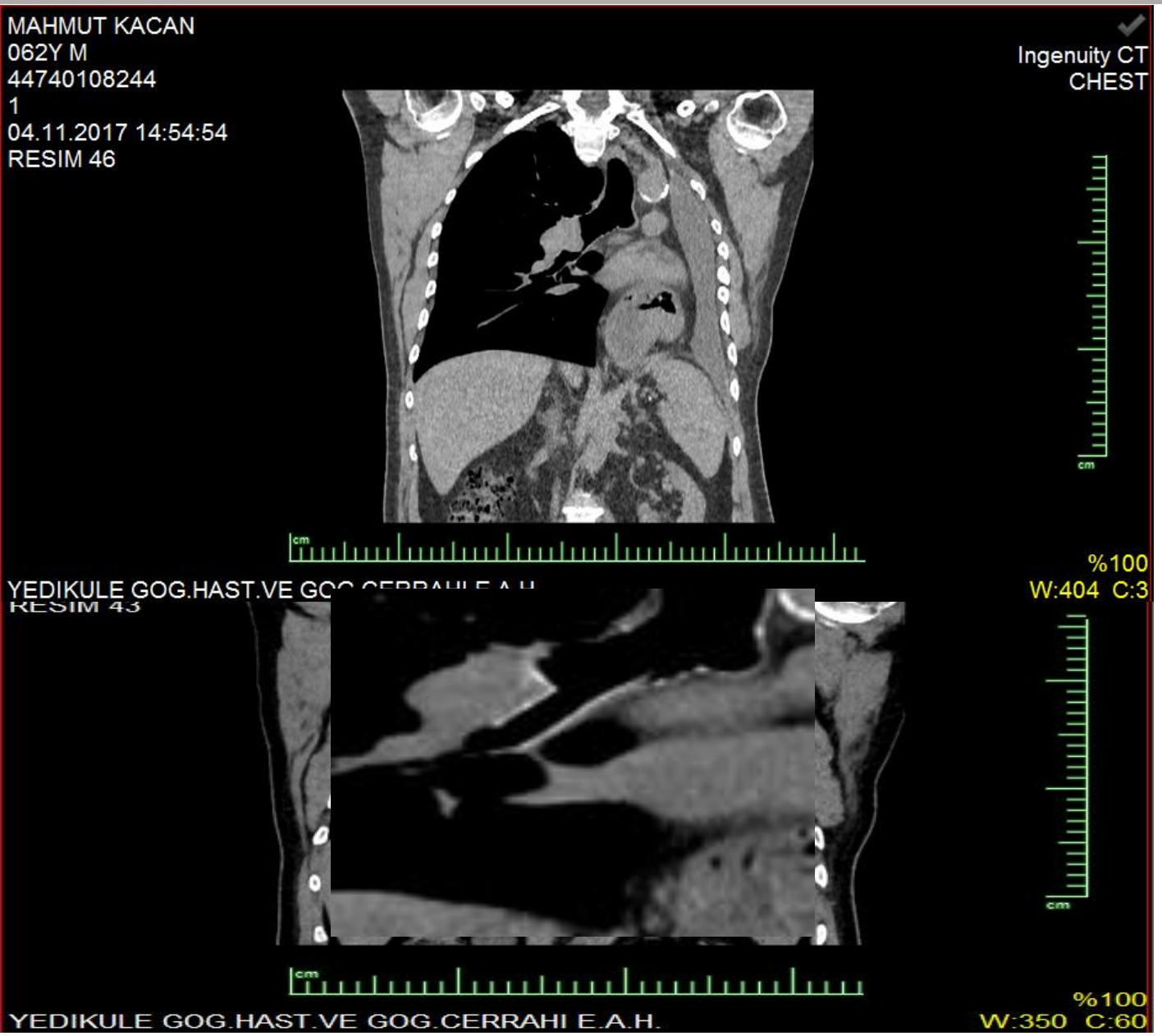
- **Sağ bronş sistemi**
- **Üst lob orifisin kapanmaması için**

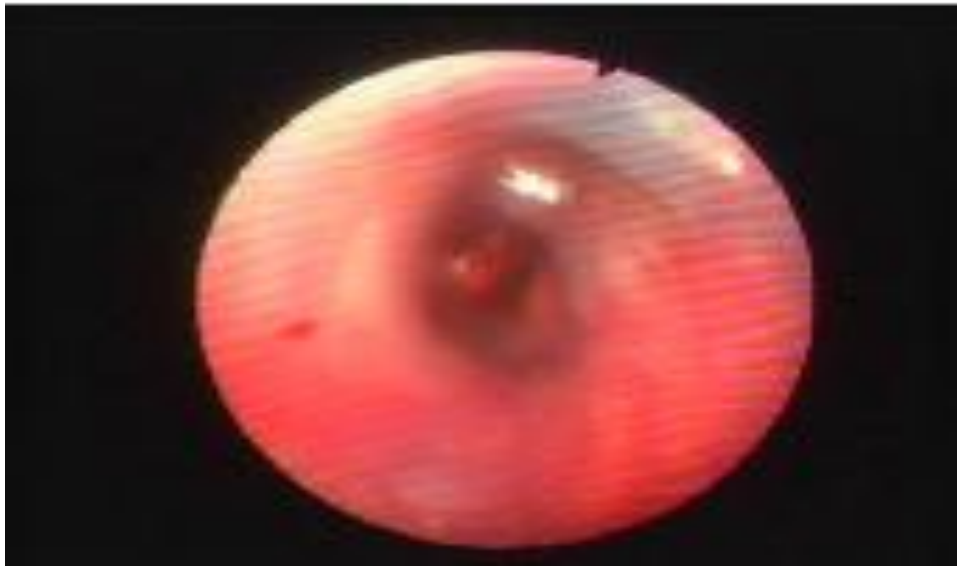
OLGU


MAHMUT KACAN
062Y M
44740108244
1
04.11.2017 14:54:54
RESIM 46
cm
cm
%100
W:404 C:3
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.



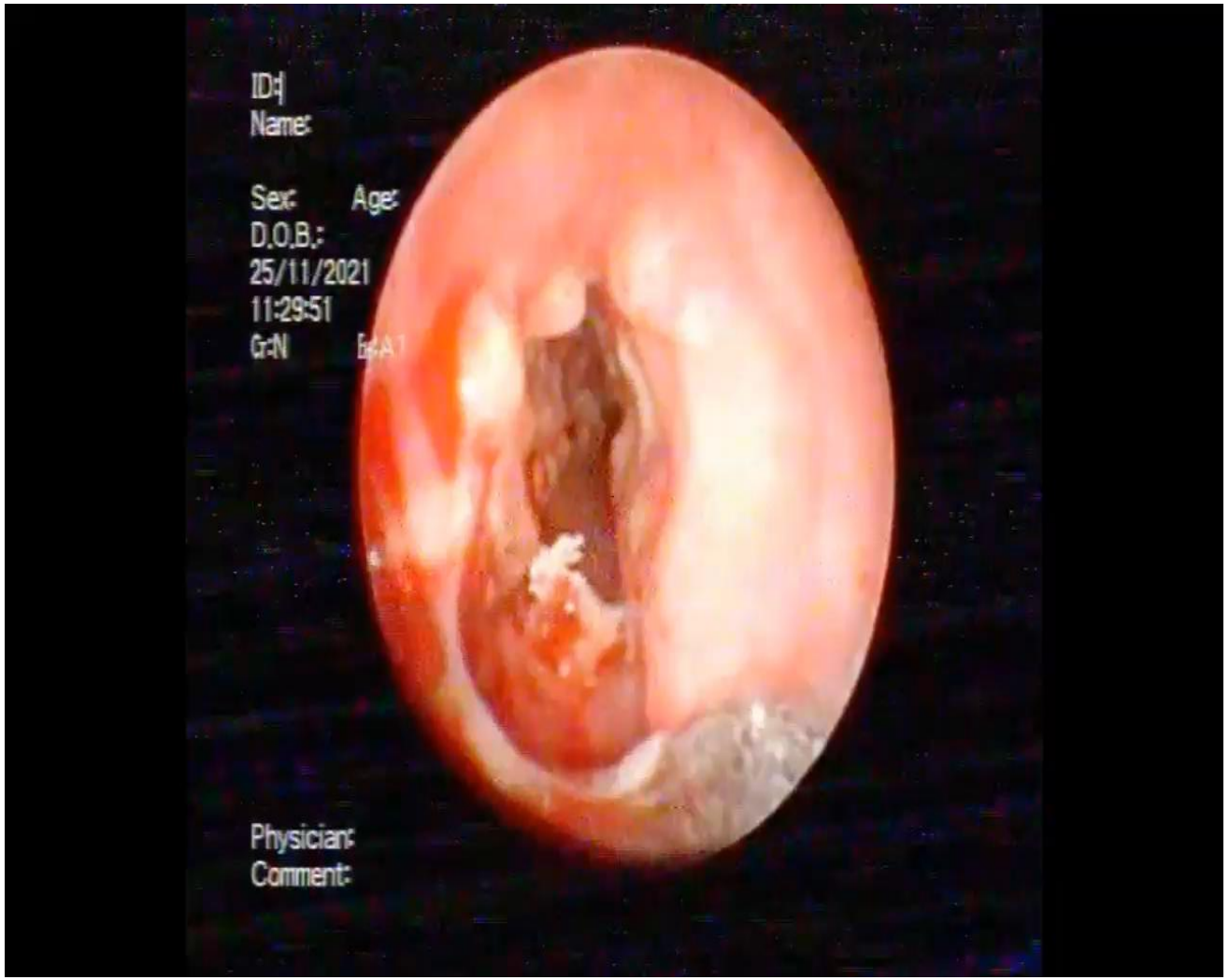
OLGU

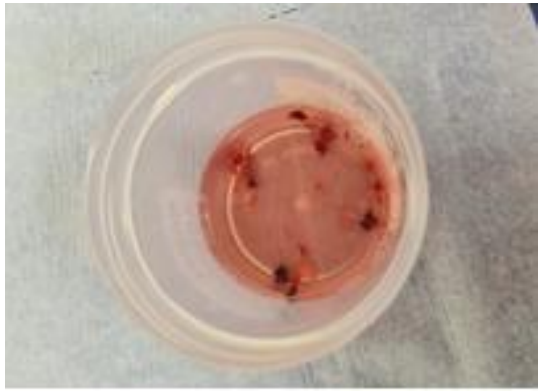

MAHMUT KACAN
062Y M
44740108244
1
04.11.2017 14:54:54
RESIM 46
Ingenuity CT
CHEST
%100
W:404 C:3
RESIM 43
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
%100
W:350 C:60

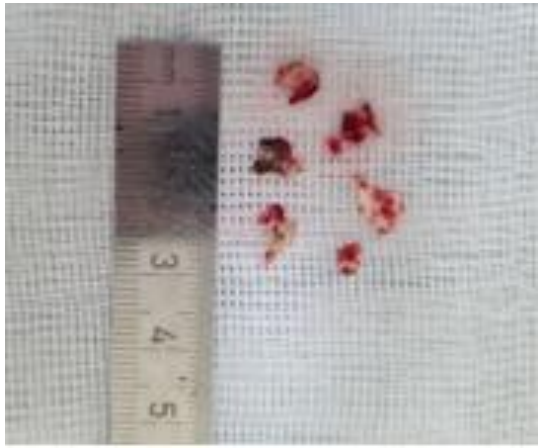


OLGU 6

RİJİD BRONKOSKOPİ-2



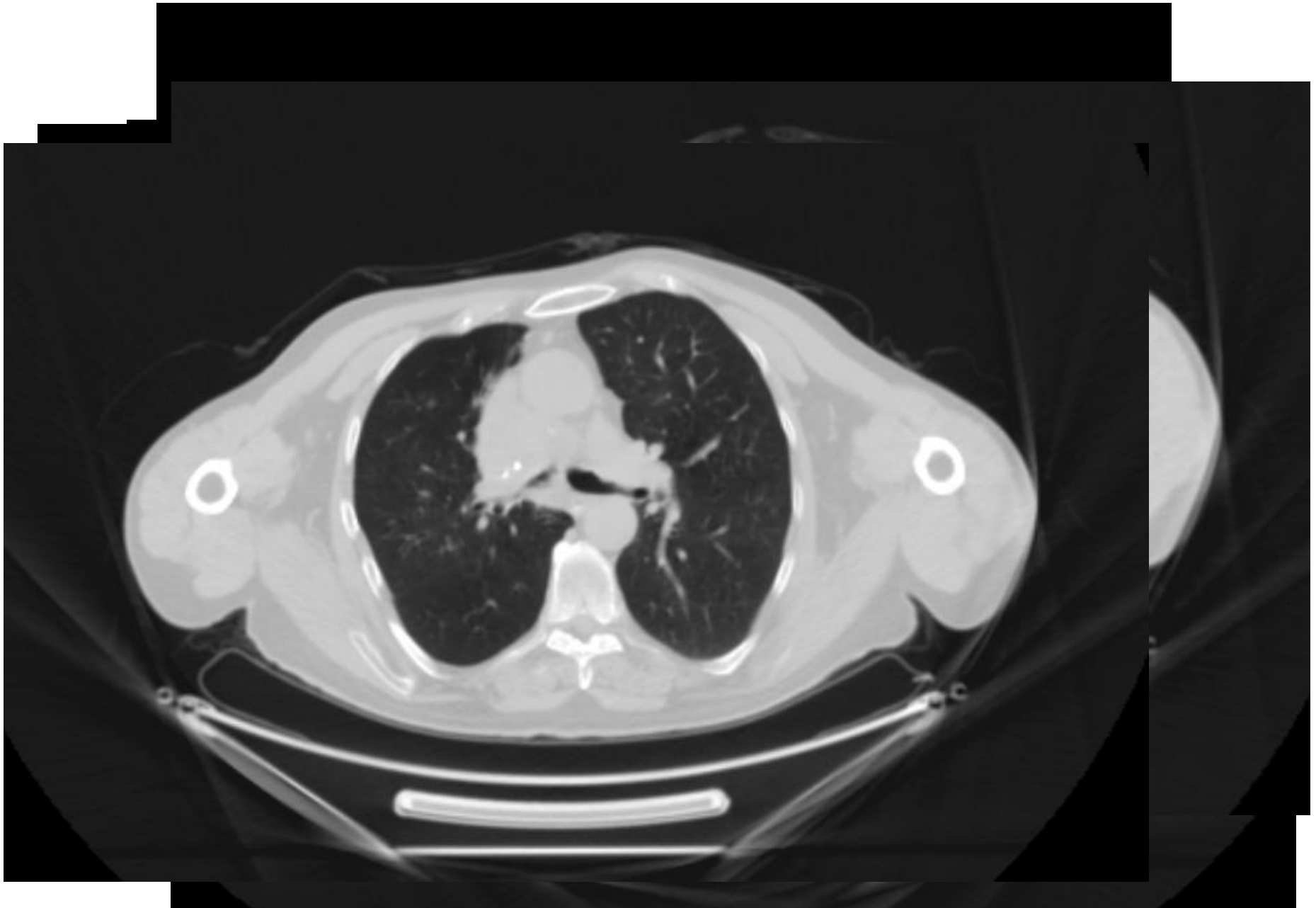




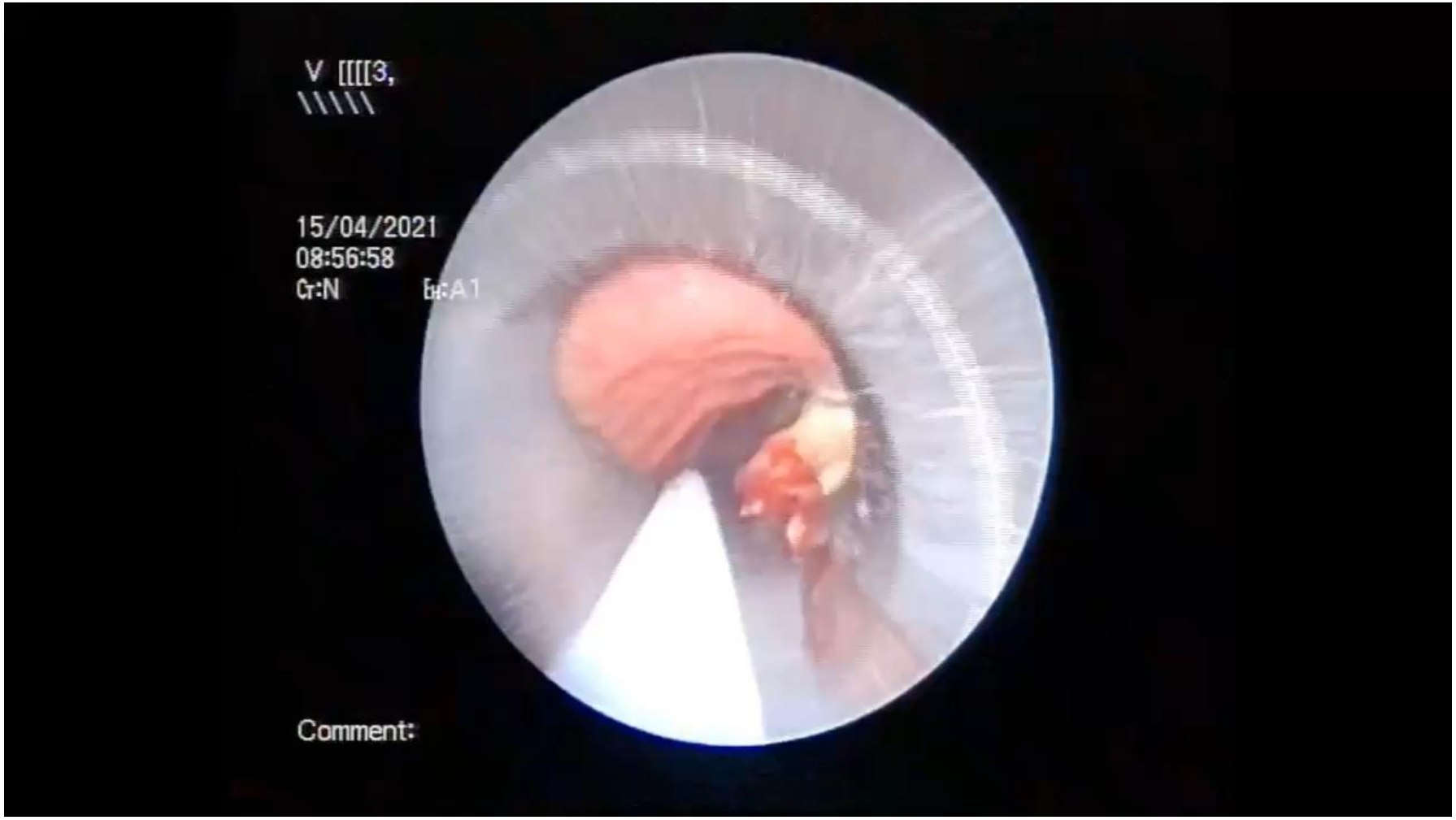
OLGU 2

- 76 yaş, erkek
- Şikayet: Nefes darlığı, ağızdan kan gelmesi
- Hikaye: 2 aydır nefes darlığı başlayan ve giderek artan hastanın 1 haftadır öksürmekle ağızdan kan gelmesi başlamış. Dış merkezde FOB yapılan hastada trakeayı oblitere eden tümöral lezyonlar ve yoğun hemoraji görmeleri nedeni ile biyopsi alınamadan işlem sonlandırılmış ve tarafımıza sevk edilmiş

OLGU 2
TORAKS BT

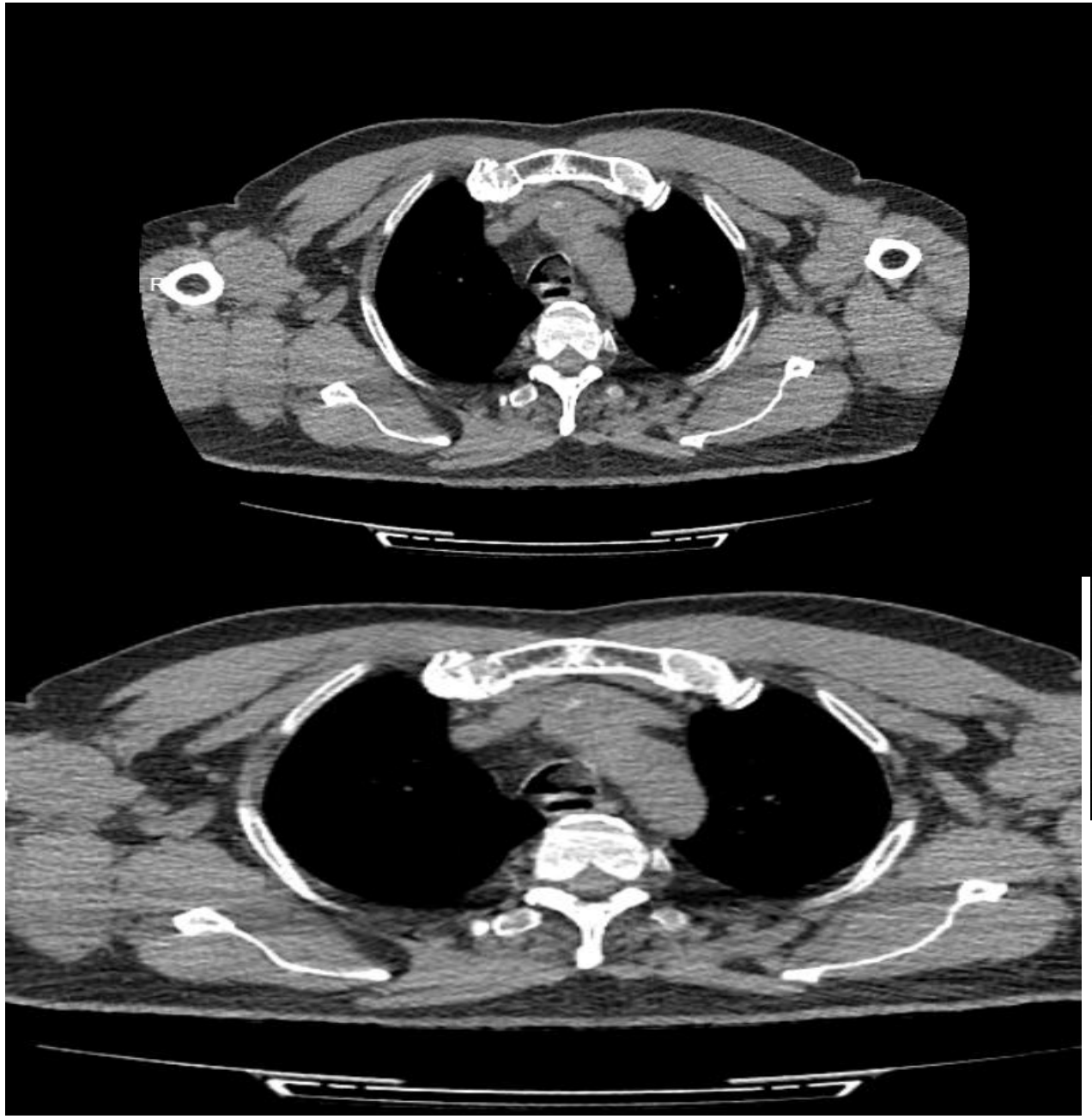


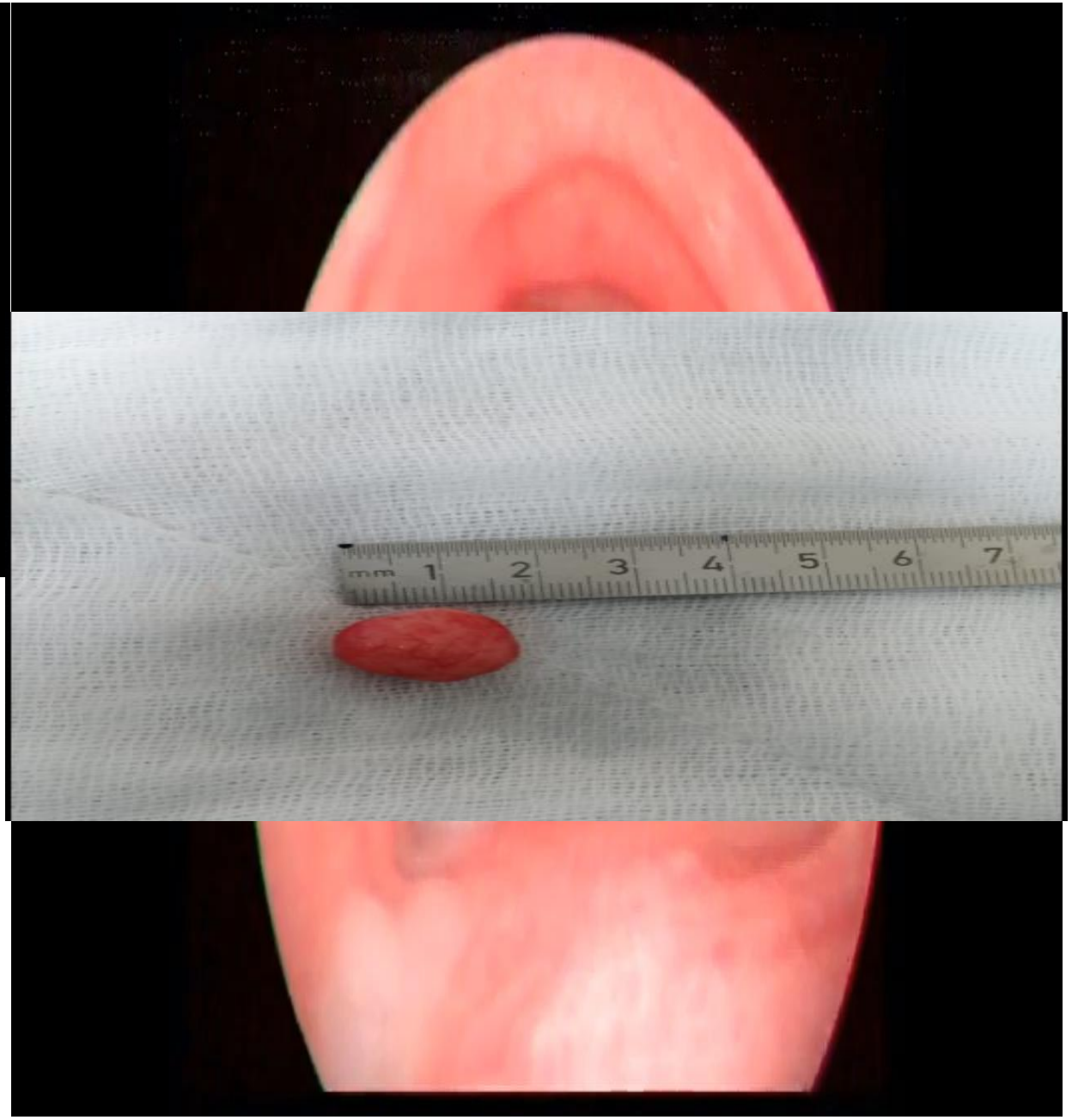
OLGU 2 RİJİD BRONKOSKOPİ



- Patoloji: Skuamöz hücreli ca.

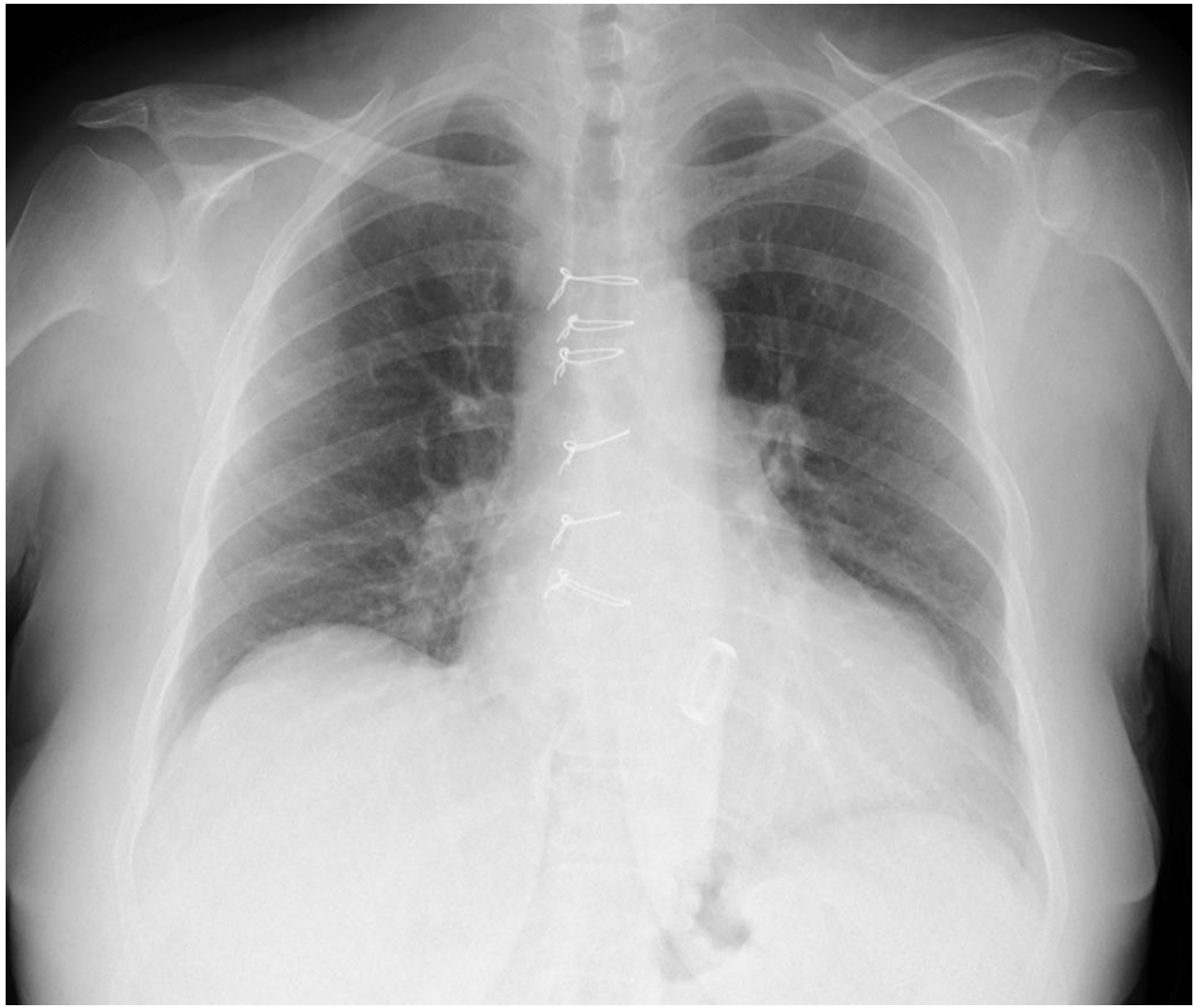
OLGU 7





OLGU 8

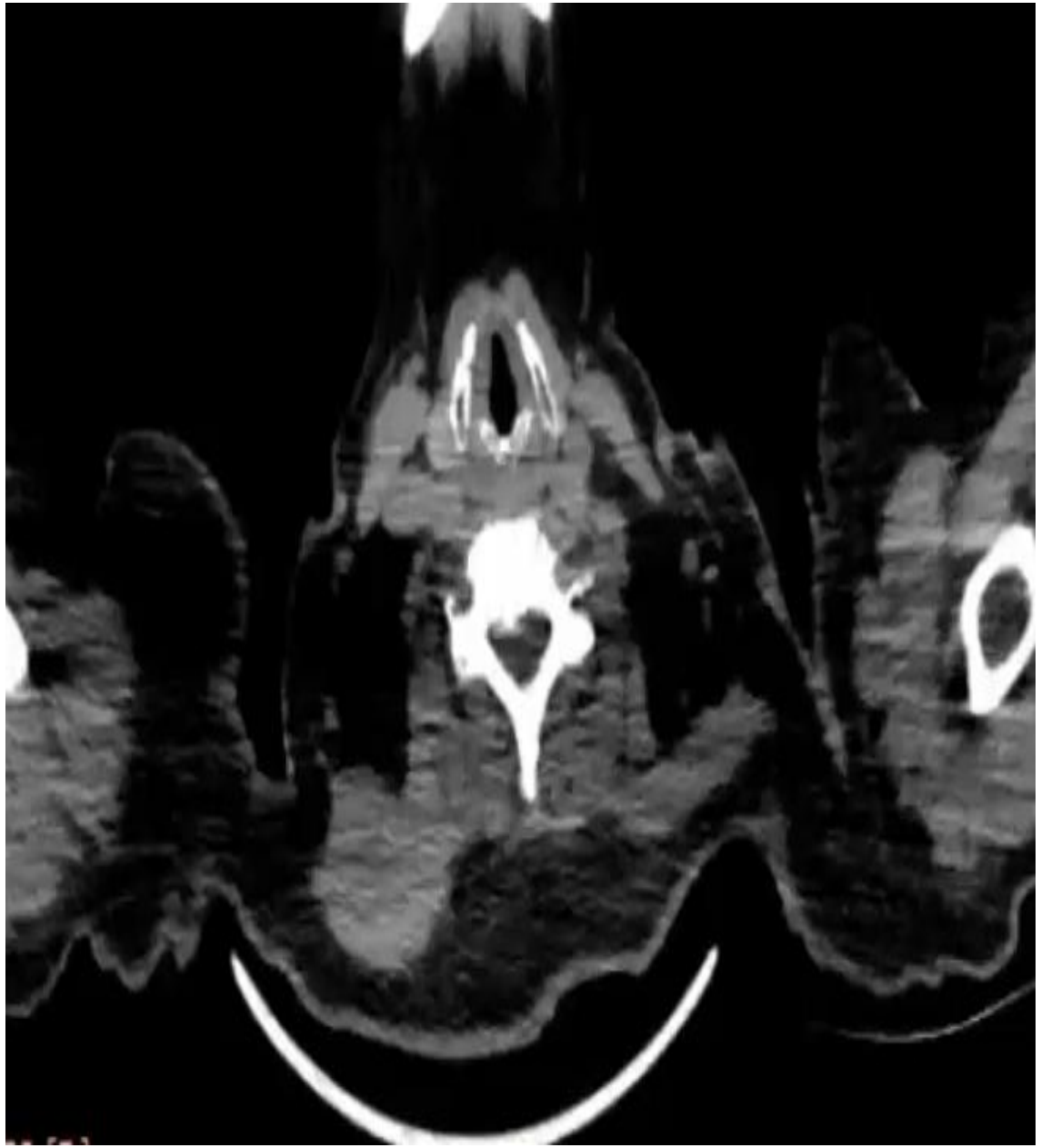
- 60 yaşında, kadın
- Şikayeti: Nefes darlığı
- Hikayesi: Nefes darlığı nedeni ile başvurduğu poliklinikte çekilen toraks BT sonrası hasta interne edilmiş
- Özgeçmiş: DM, HT, İKH, KBY, opere MVR, Covid-19 pnömonisi nedeni ile 3 ay önce entübe halde YBÜ yatışı



PA AKCİĞER GRAFİSİ

OLGU 8

- Alışkanlık: Bir özellik yok
- Fizik Muayene: TA:140/100 NDS:135/dak
  Sat: %94(oda) SDS: 28/dak
- Solunum Sistemi: Bilateral solunum sesleri azalmış, alt alanlarda raller(+)
- Kardiovasküler Sistem: Taşikardik, VES(+), Bilateral pretibial ödem(++/++)



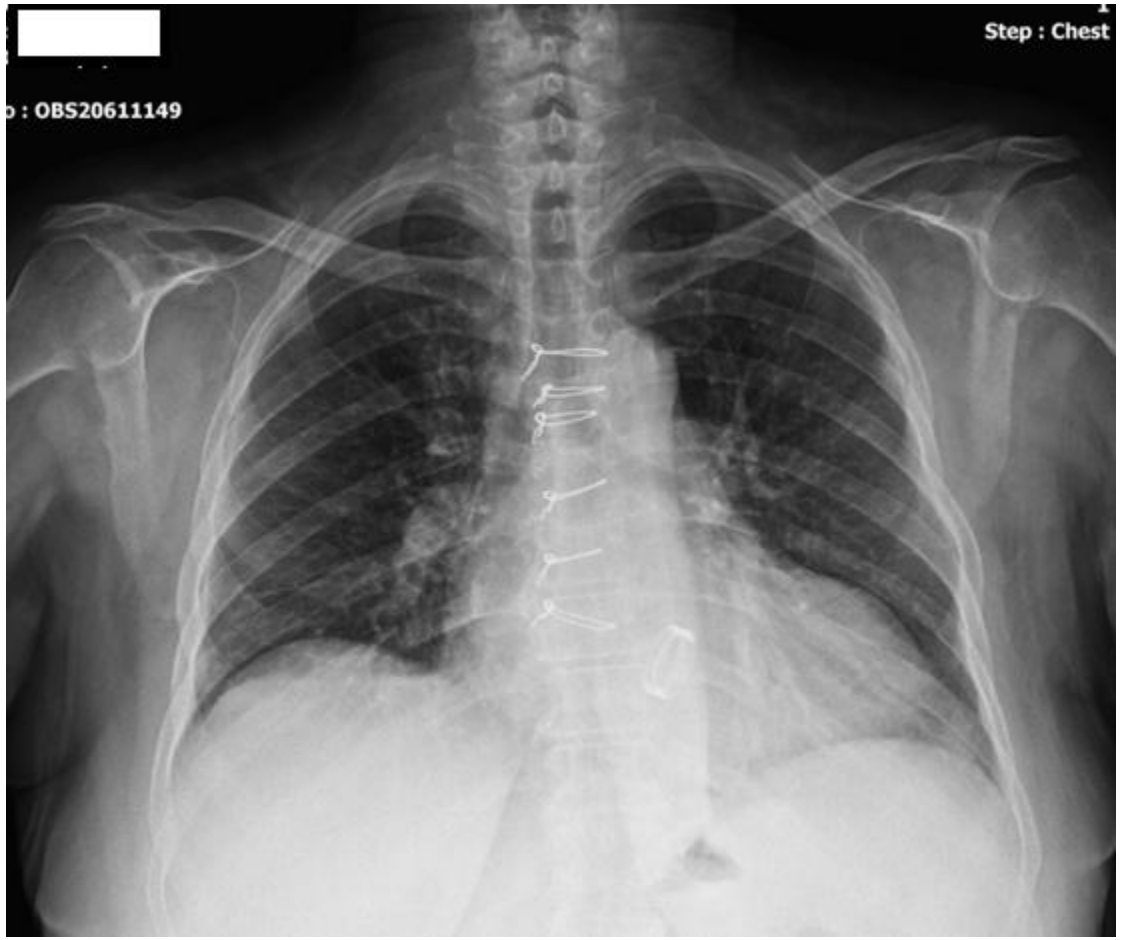
TORAKS BT

OLGU 8

İLK RİJİD BRONKOSKOPİ

OLGU 8

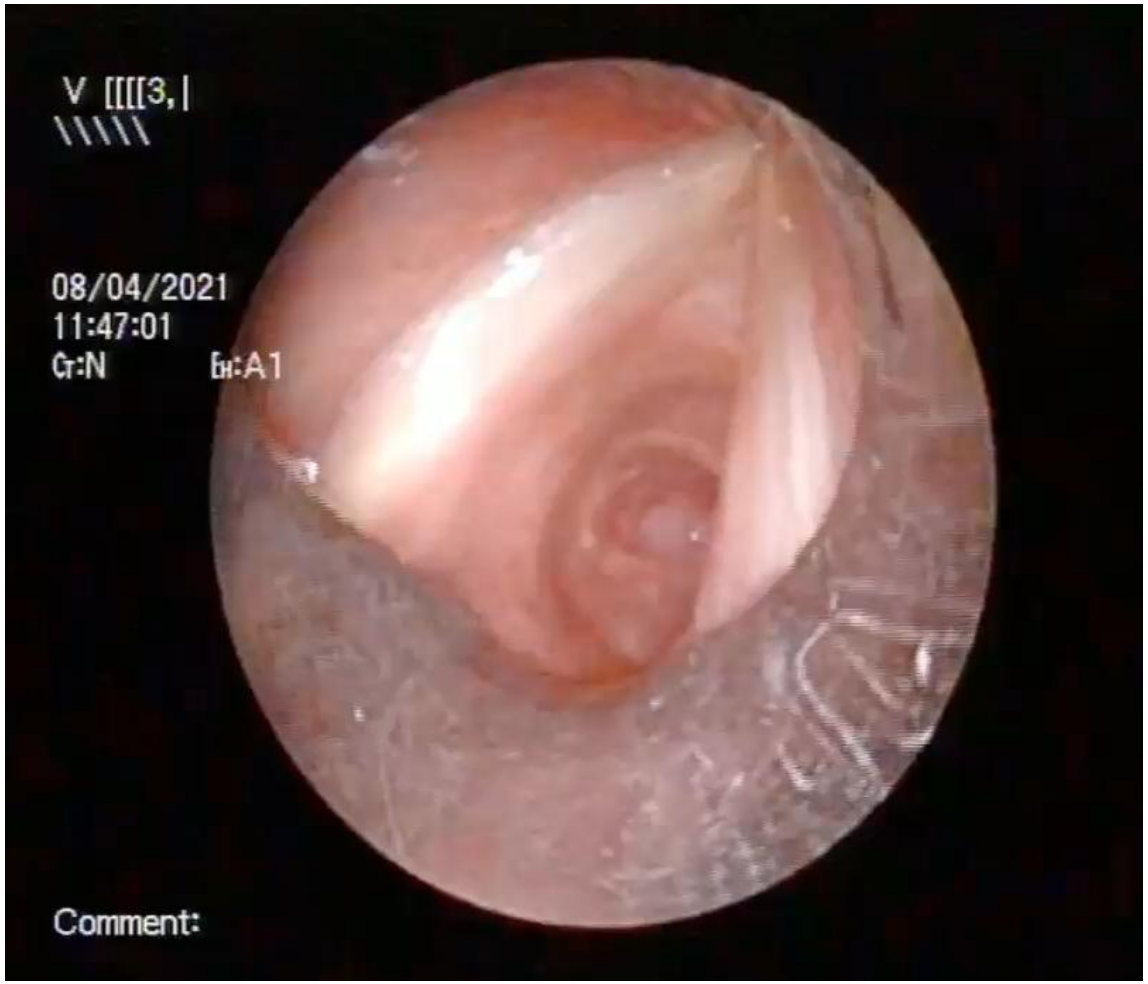
- Hasta dilatasyon işleminden 1 ay sonra yine aynı semptom ile başvurdu



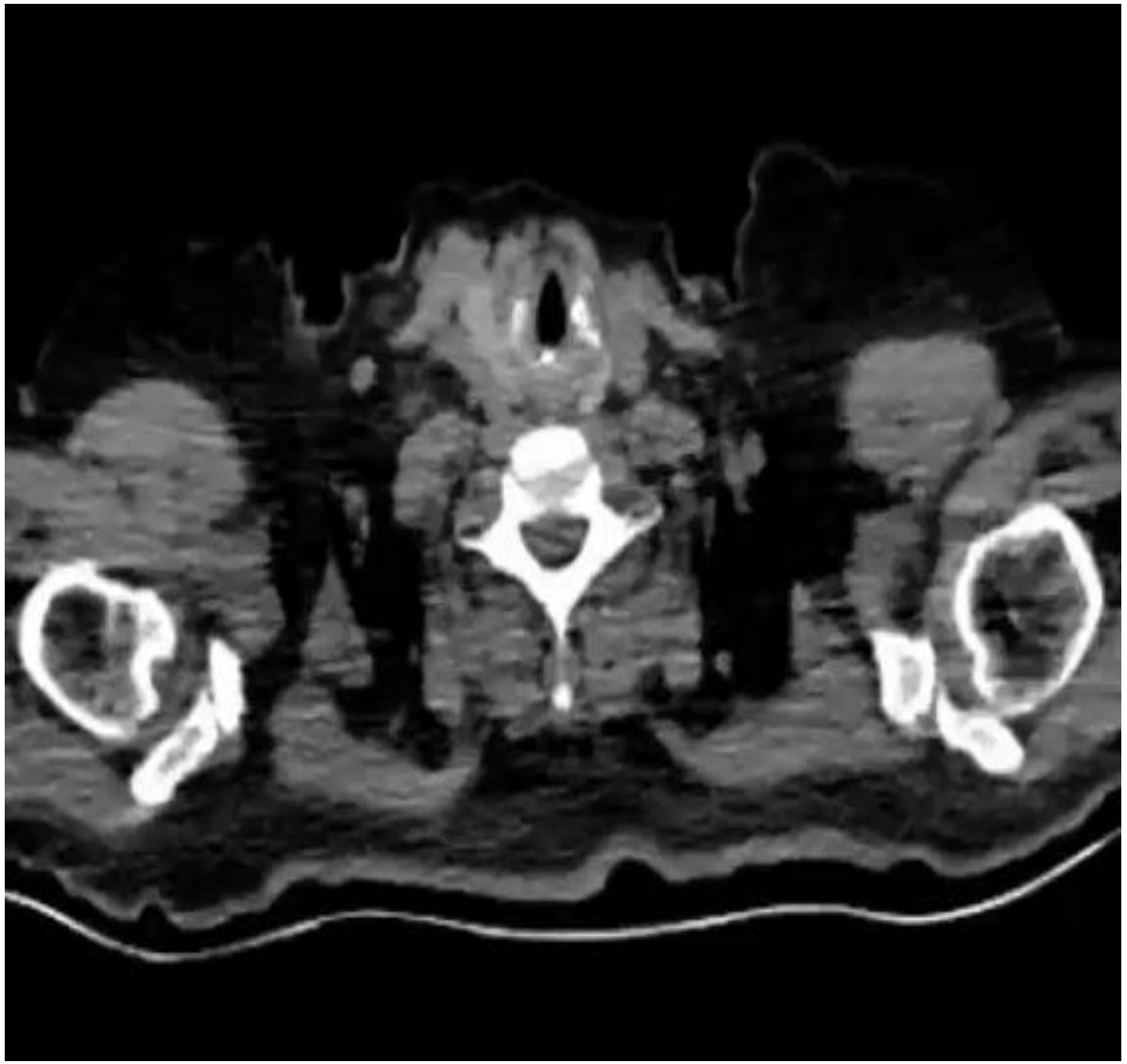
SON BAŞVURU PA AKCİĞER GRAFİSİ

SON RİJİD BRONKOSKOPİ

OLGU 8

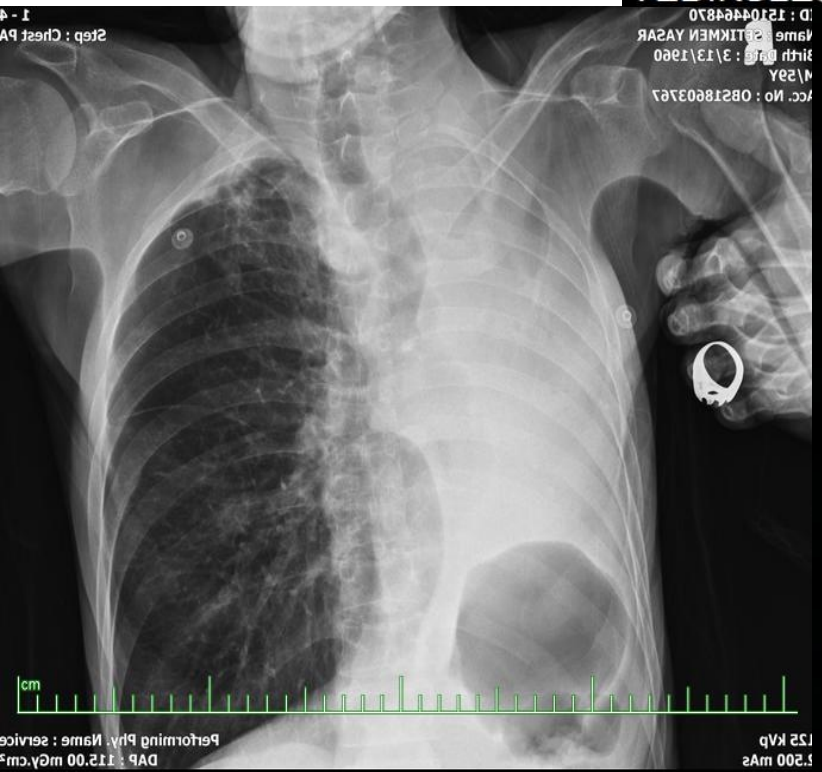


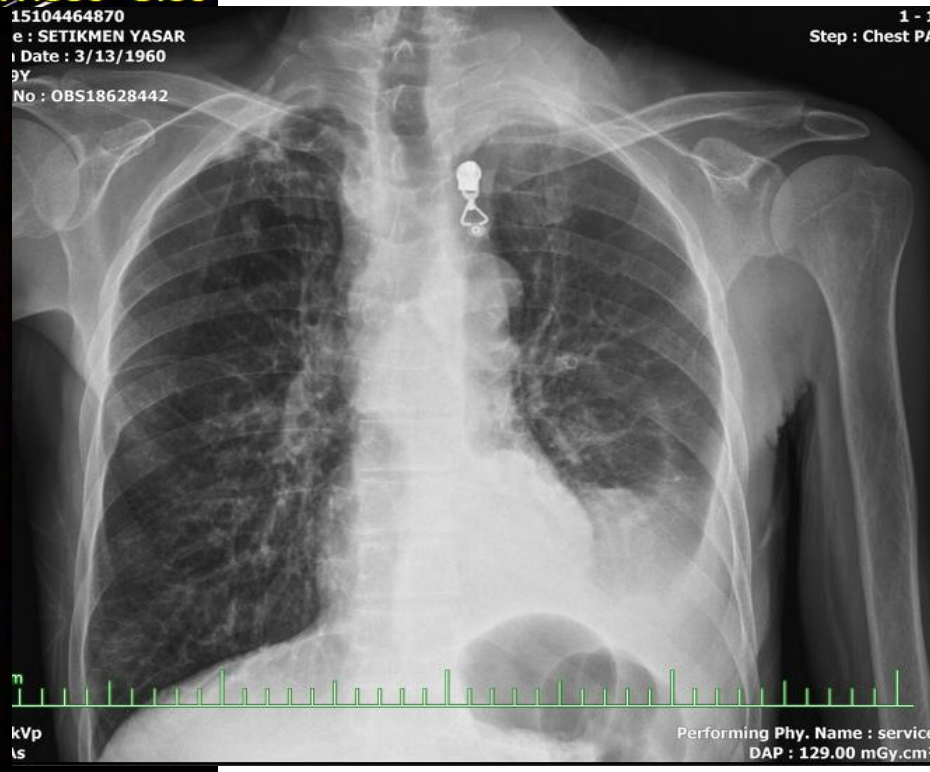
OLGU 8



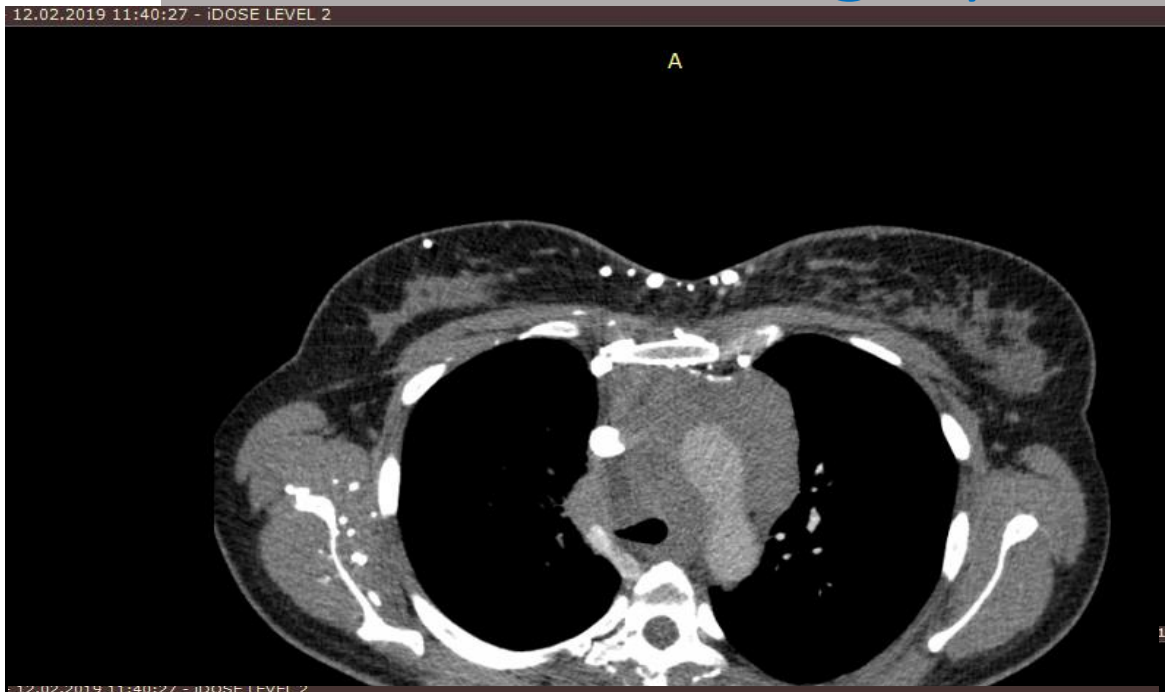
STENT SONRASI TORAKS BT

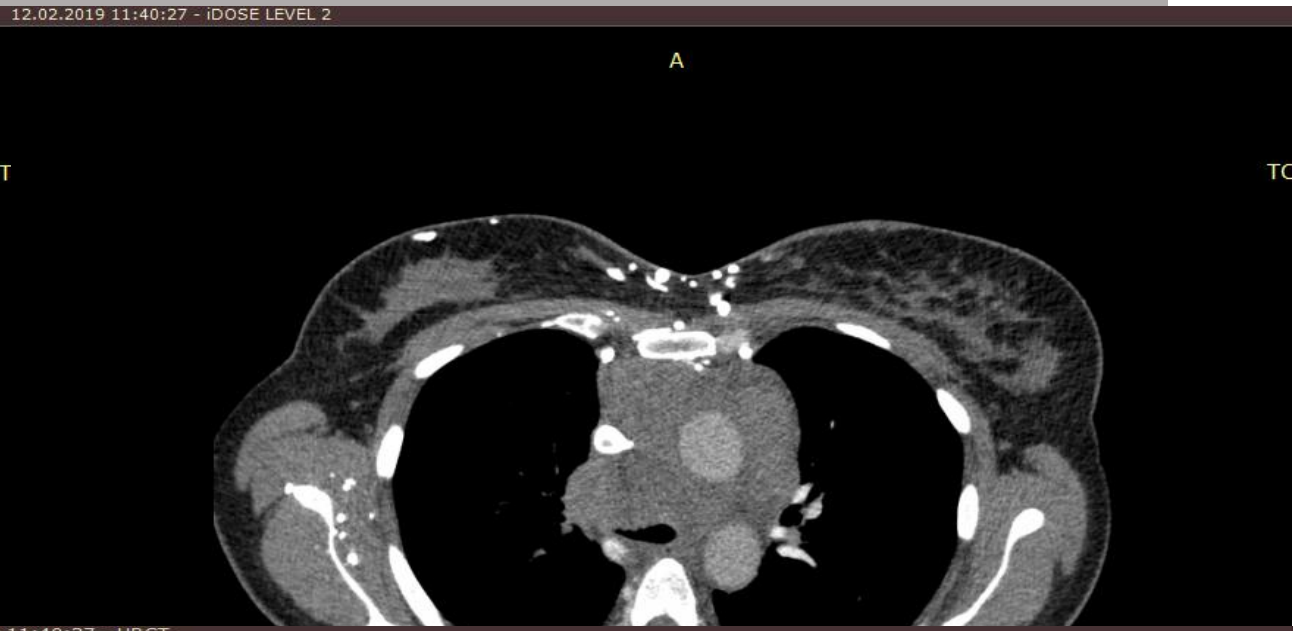
Video olgu endolüminal

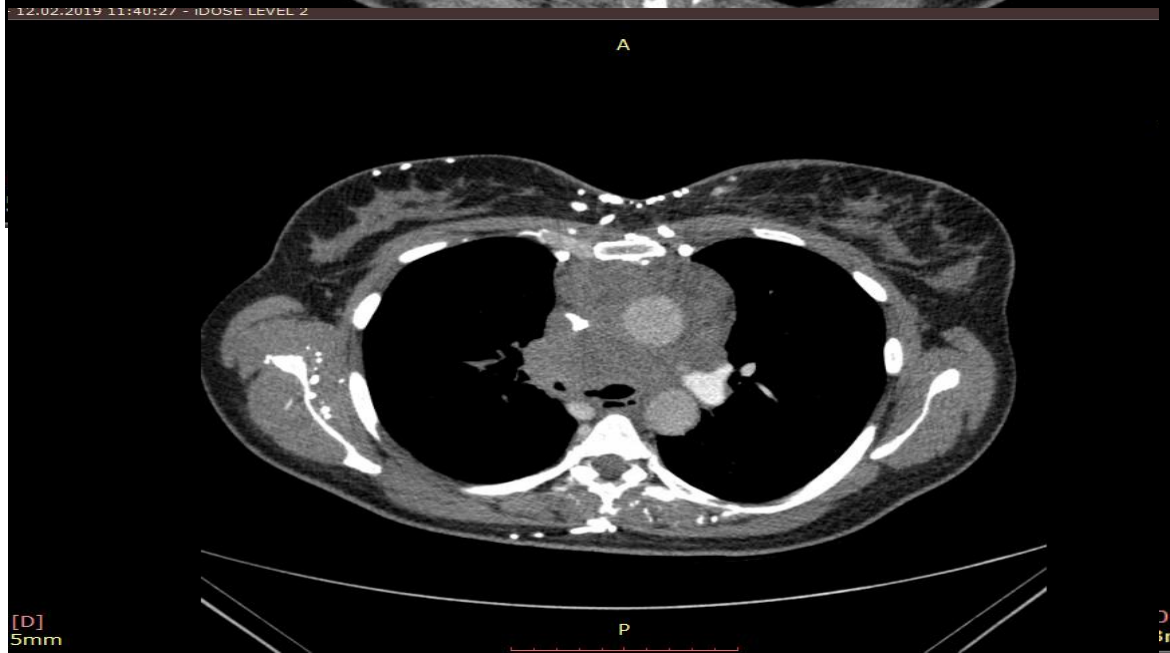


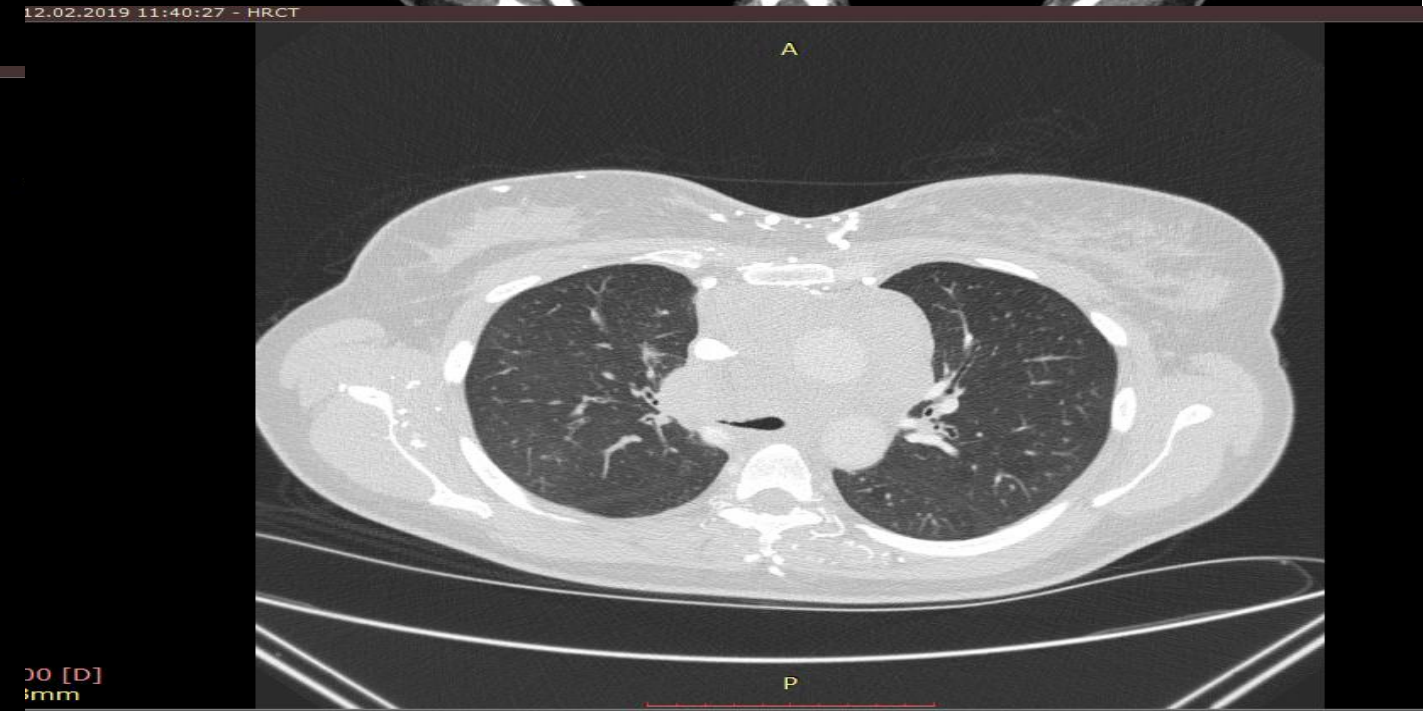


36 Y K video olgu y stent



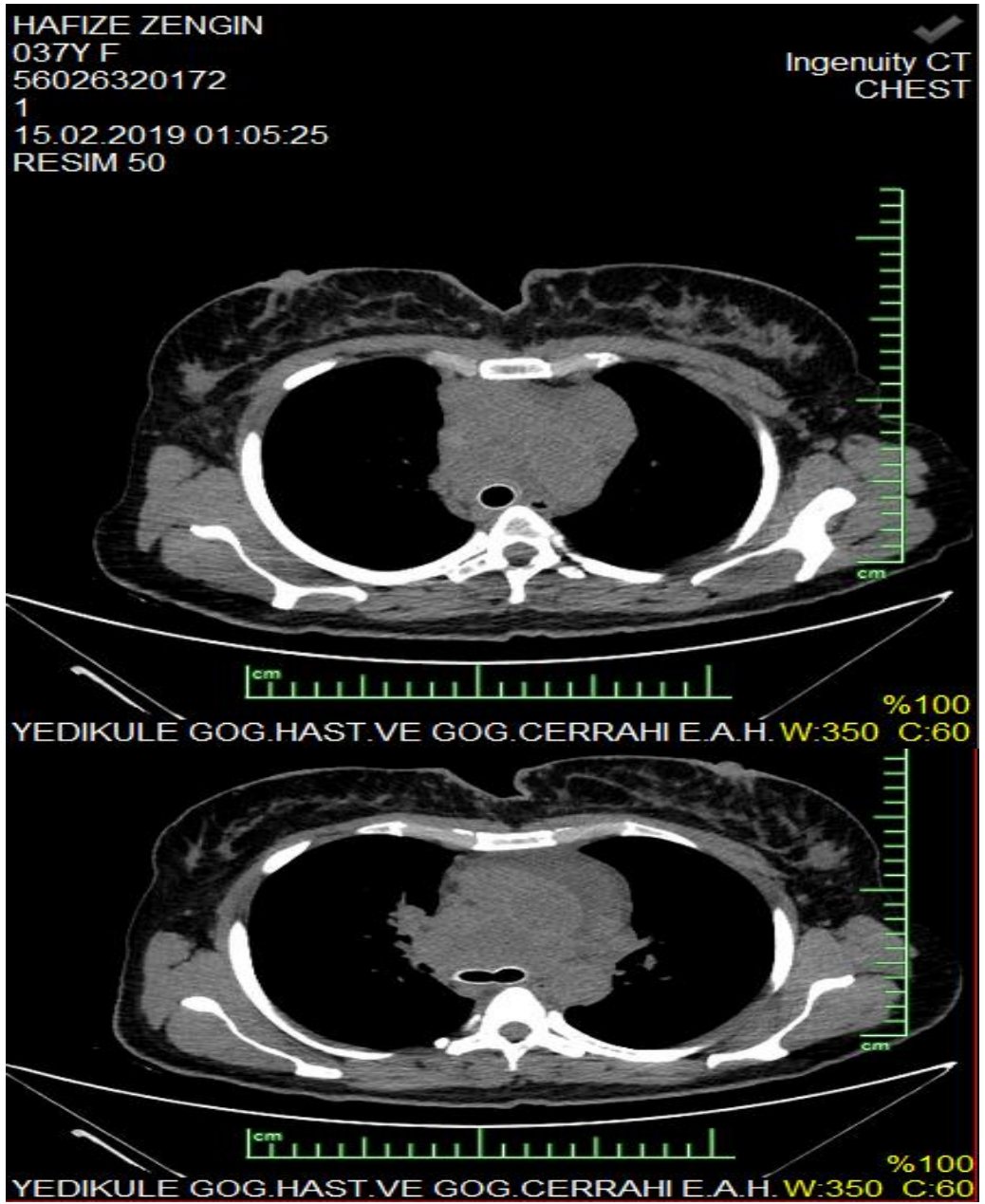


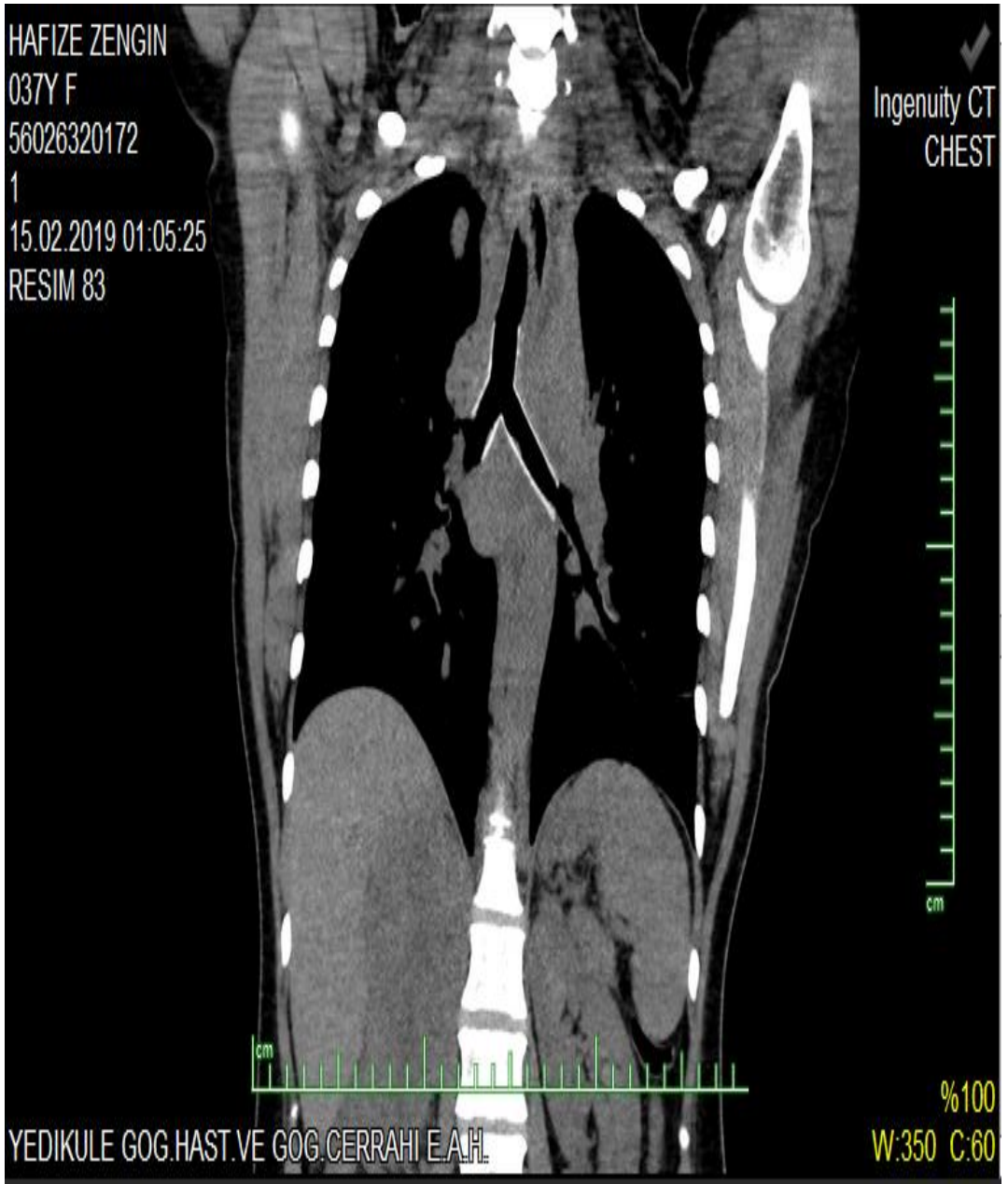




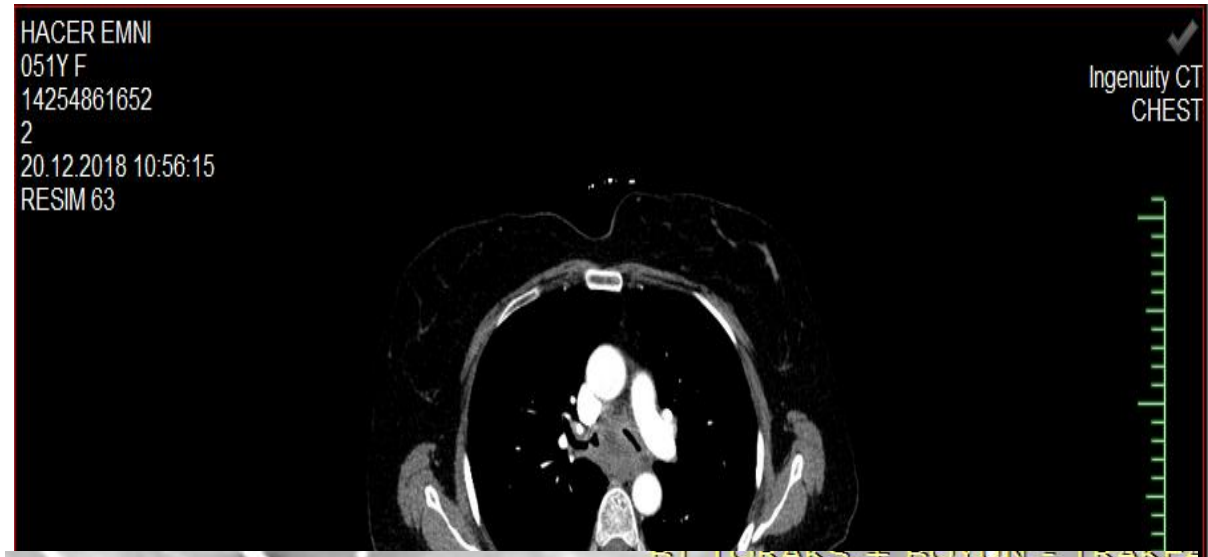
VİDEO OLGU Y STENT

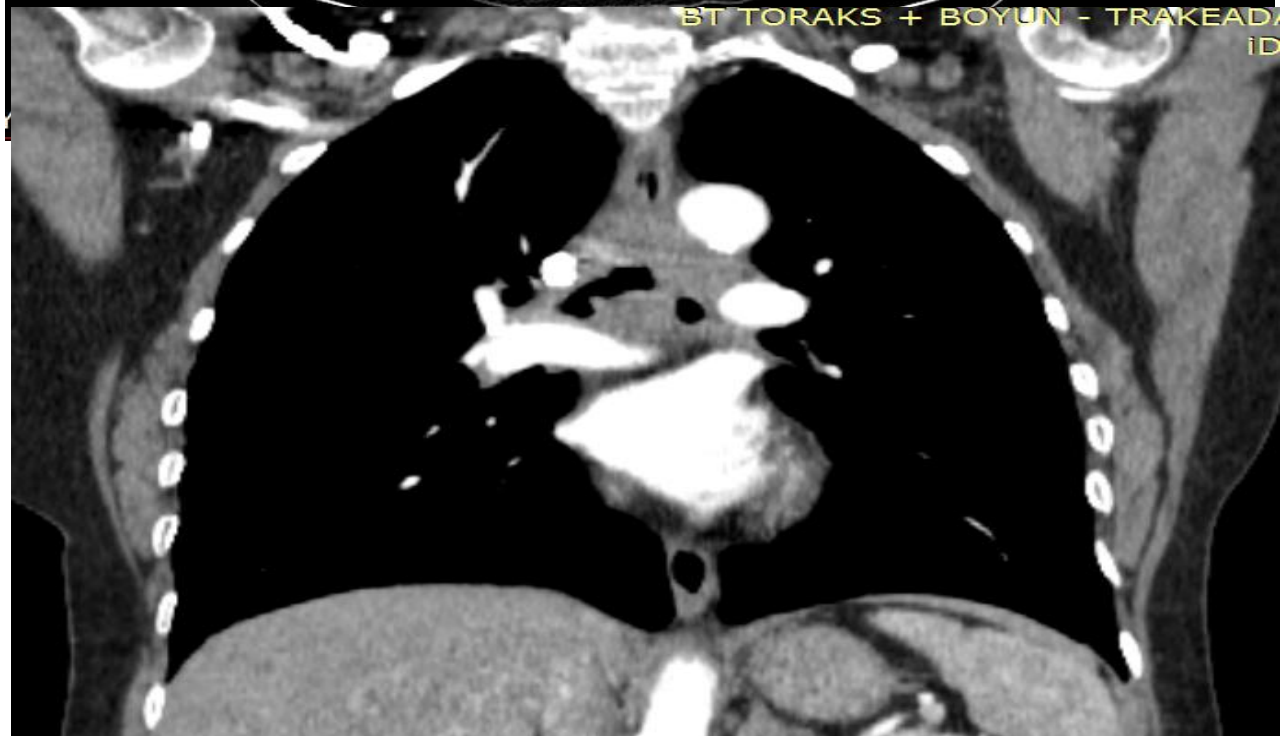
OLGU

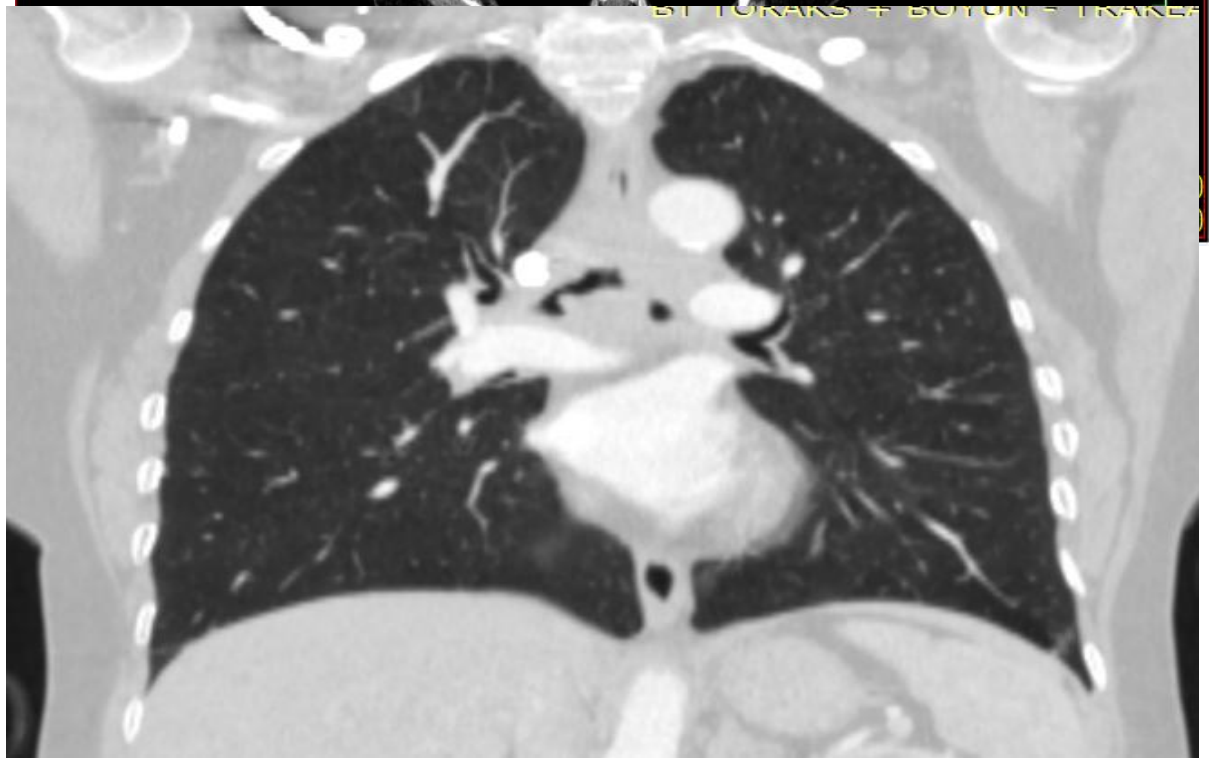

HAFIZE ZENGIN
037Y F
56026320172
1
15.02.2019 01:05:25
RESIM 50
Ingenuity CT
CHEST
%100
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H. W:350 C:60
%100
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H. W:350 C:60


HAFIZE ZENGIN
037Y F
56026320172
1
15.02.2019 01:05:25
RESIM 83
Ingenuity CT
CHEST
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
%100
W:350 C:60

55 Y K video olgu

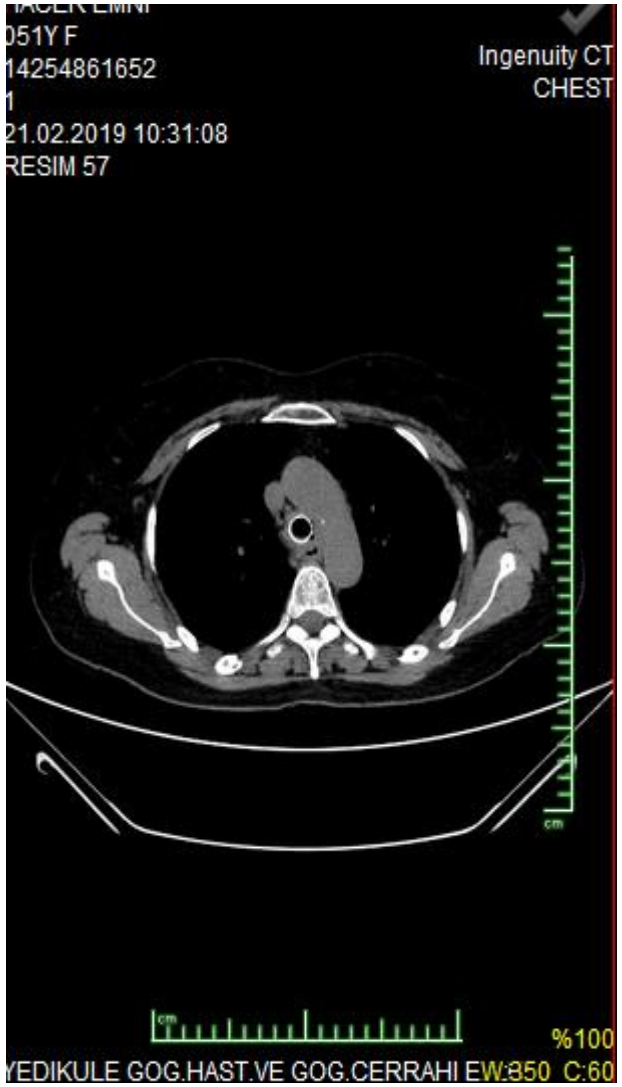


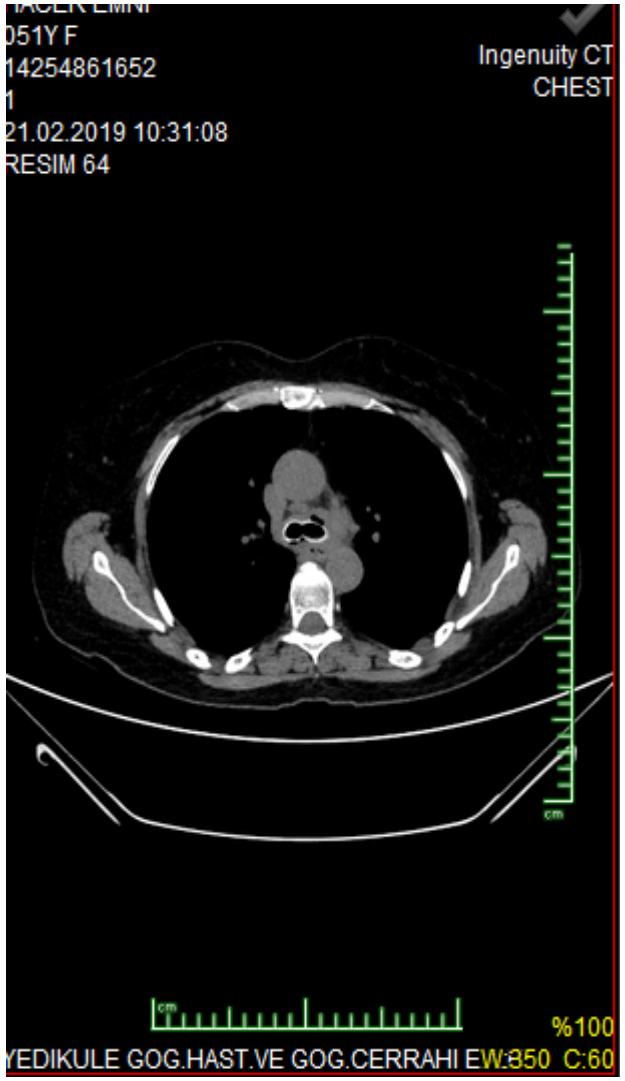


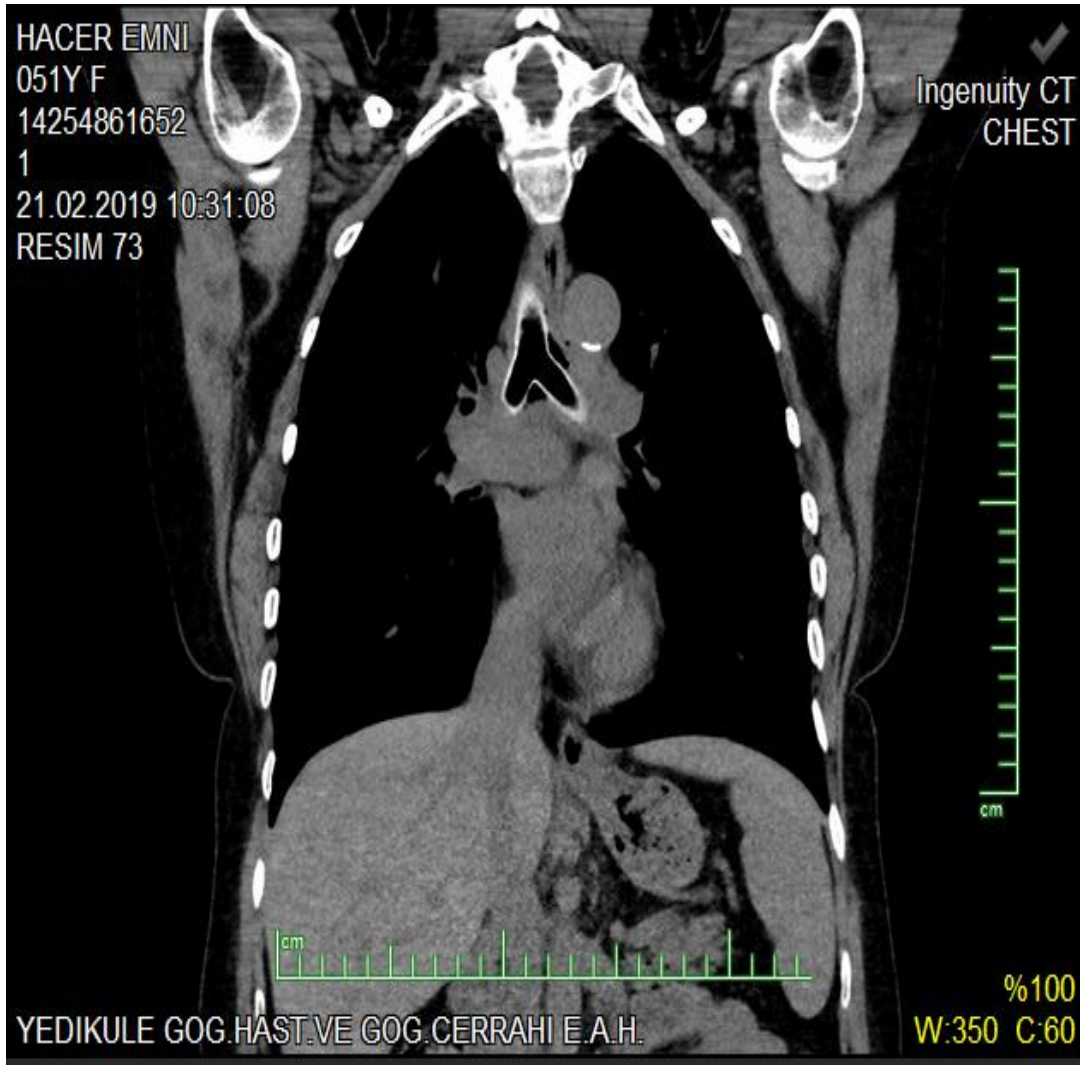


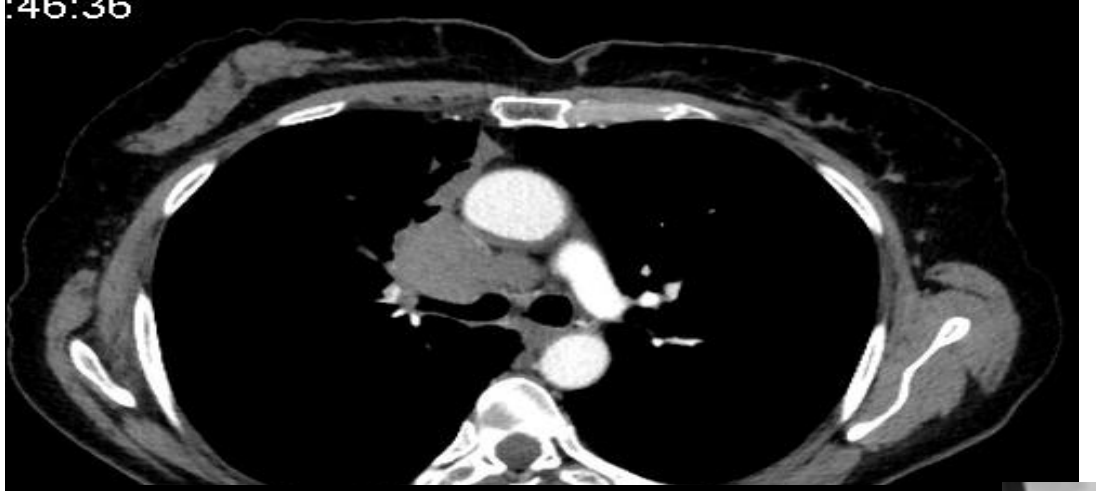
VİDEO OLGU Y STENT

video olgu y stent



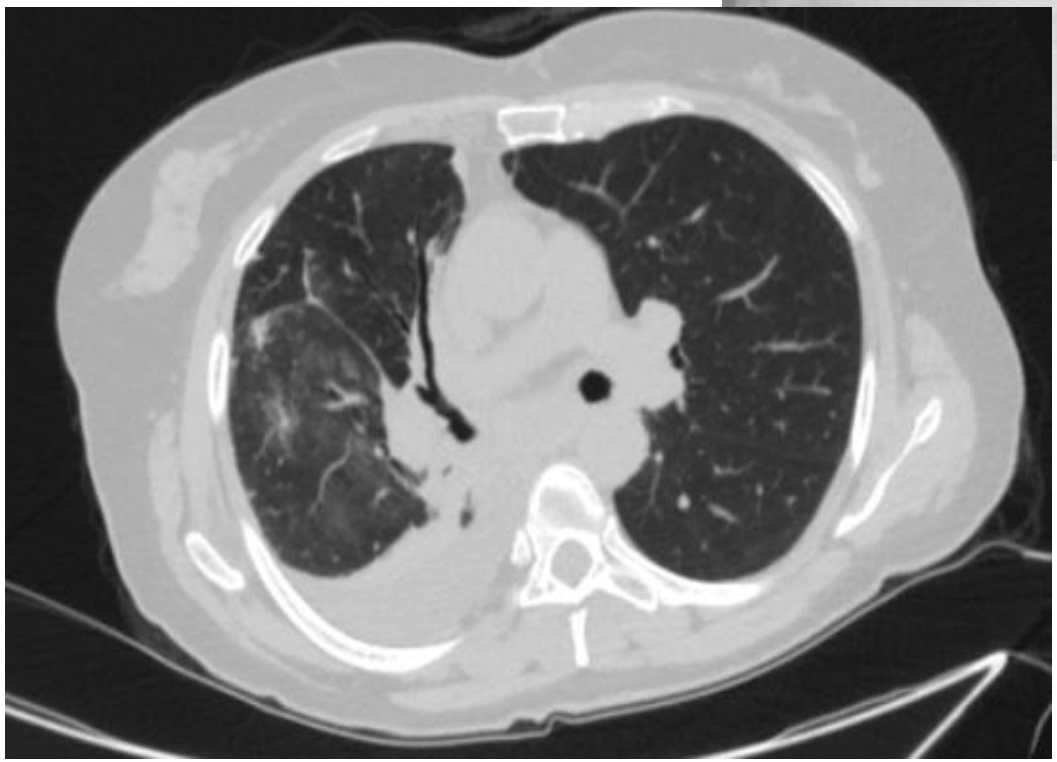


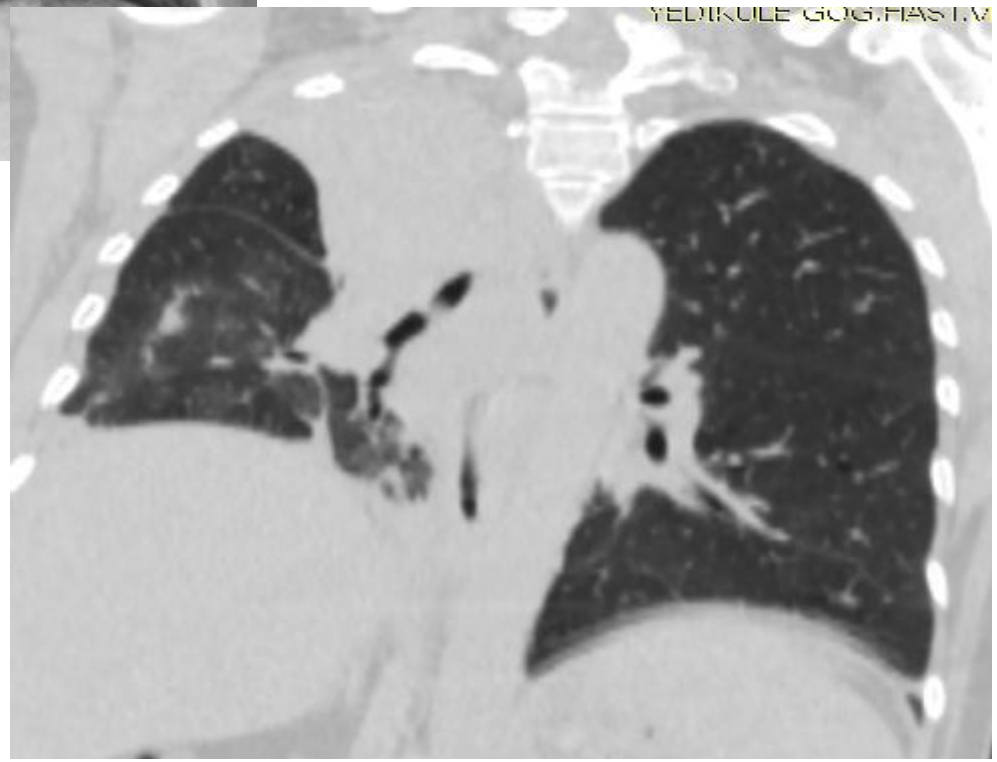



:46:36

0 00:31:21

1960
62918





PERİFERİK PULMONER LEZYONLAR

life

MDPI

Review

Endoscopic Technologies for Peripheral Pulmonary Lesions: From Diagnosis to Therapy

Alberto Fantin [1,*], Massimiliano Manera [2], Vincenzo Patruno [1], Giulia Sartori [2], Nadia Castaldo [1] and Ernesto Crisafulli [2]

Method	Advantages	Disadvantages
Ultrathin bronchoscopy	• Affordable • Easily introduced into an already-established clinical practice	• Operator-dependent tip stability • Small working channel
RP-EBUS	• Affordable • Easily introduced into an already-established clinical practice	• Need to interpret artifacts • No real-time guidance during sampling
Virtual navigation bronchoscopy	• Active navigation correction according to preprocedural planning • BTPNA	• CT-to-body divergence • Absence of real-time position correction by fluoroscopy
EMN	• Active navigation correction according to preprocedural planning • Ability to associate real-time navigation correction with fluoroscopy • Real-time guidance during sampling	• CT-to-body divergence • Interference with metallic objects and other magnetic fields
Shape-sensing navigation	• Operator-independent tip stability	• Expensive in terms of acquisition (at present only within robotic bronchoscopy technology)
Augmented fluoroscopy	• Real-time navigation correction with fluoroscopy	• Expensive in terms of acquisition
CBCT	• The gold standard for tool-in-lesion confirmation	• Expensive in terms of acquisition • Non-negligible radiation exposure
Robotic bronchoscopy	• Integration of a navigation system within an articulating catheter that can be used for multiple purposes	• Expensive both in terms of acquisition and consumables • Technical demanding • Requires general anesthesia • CT-to-body divergence

RP-EBUS, radial-probe endobronchial ultrasound; BTPNA, bronchial transparenchymal nodule access; EMN, electromagnetic navigation; CBCT, cone-beam computed tomography.

> Respiration. 2021;100(6):538-546. doi: 10.1159/000515181. Epub 2021 Apr 12.

Efficacy and Safety of Cone-Beam Computed Tomography-Derived Augmented Fluoroscopy Combined with Endobronchial Ultrasound in Peripheral Pulmonary Lesions

Kai-Lun Yu [1] [2], Shun-Mao Yang [3], Huan-Jang Ko [3], Hui-Yu Tsai [4], Jen-Chung Ko [1], Ching-Kai Lin [5], Chao-Chi Ho [6], Jin-Yuan Shih [2] [6]

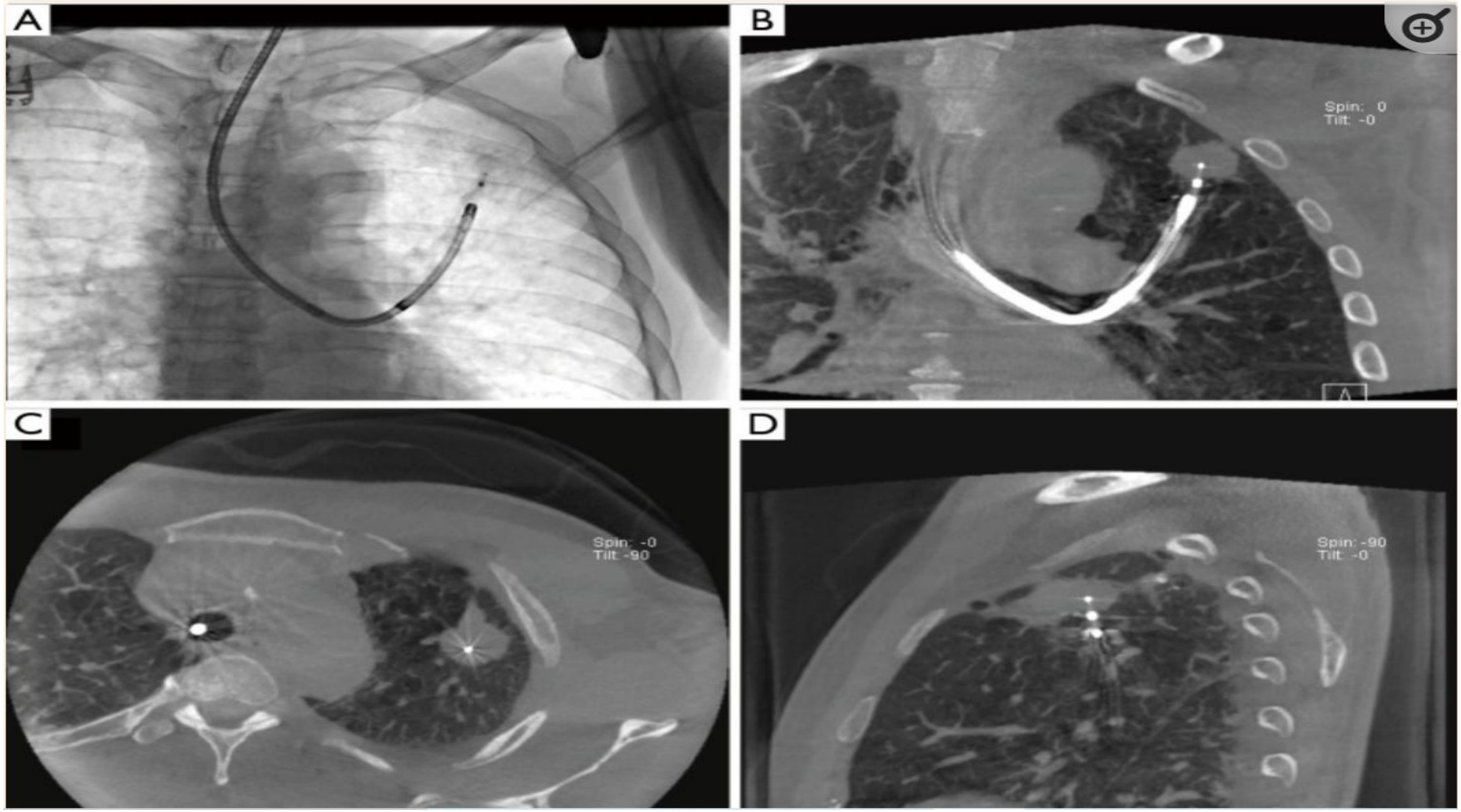
Background: The diagnostic yield of peripheral pulmonary lesions (PPLs) using radial endobronchial ultrasound (EBUS) remains challenging without navigation systems. Cone-beam computed tomography-derived augmented fluoroscopy (CBCT-AF) represents a recently developed technique, and its clinical utility remains to be investigated.

Objectives: The aim of this study was to investigate the diagnostic yield of transbronchial biopsy (TBB) using a combination of CBCT-AF and radial EBUS.

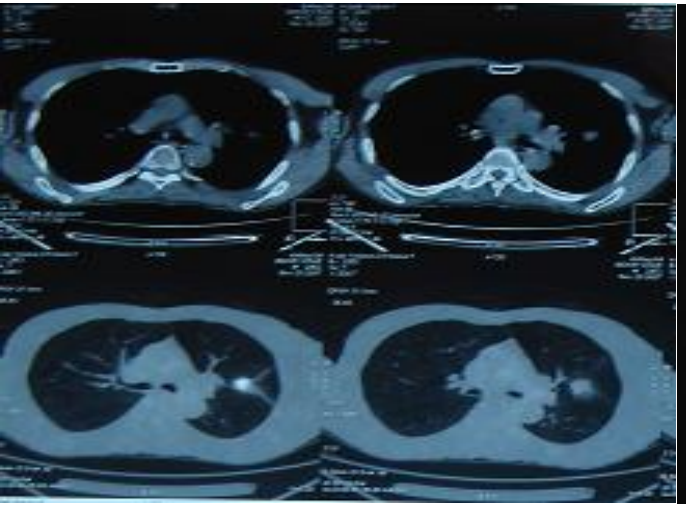
Methods: We recruited consecutive patients with PPLs who underwent radial EBUS-guided TBB, with or without AF, between October 2018 and July 2019. Following propensity score 1:1 matching, we recorded the procedure-related data and measured their efficacy and safety.

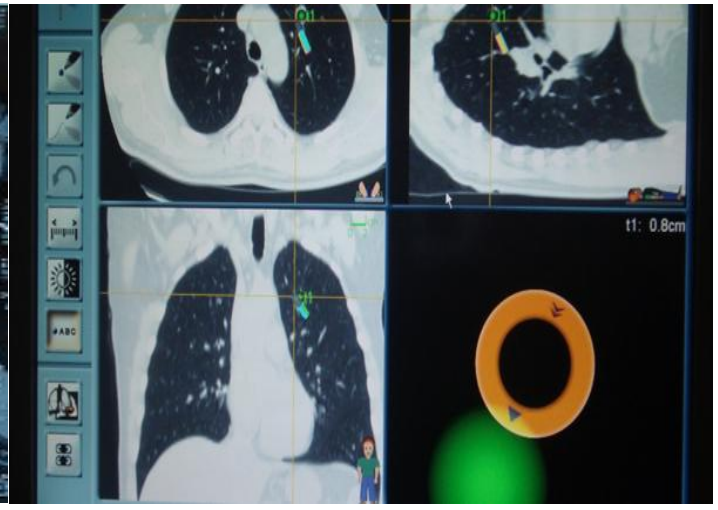
Results: While 72 patients received EBUS-plus-AF, 235 patients received EBUS only. We included 53 paired patients following propensity score matching. The median size of lesions was 2.8 and 2.9 cm in the EBUS-plus-AF group and EBUS-only group, respectively. Diagnostic yield was higher in the former group (75.5 vs. 52.8%; $p = 0.015$). The diagnostic yield for the EBUS-plus-AF group was significantly higher for lesions ≤30 mm (73.5 vs. 36.1%; $p = 0.002$). Moreover, there was no significant difference in the complication rates (3.8 vs. 5.7%; $p = 1.000$). Twenty-four nodules (45.3%) were invisible by fluoroscopy in the EBUS-plus-AF group. All of them were identifiable on CBCT images and successfully annotated for AF. The mean radiation dose of total procedure, CBCT, and fluoroscopy was 19.59, 16.4, and 3.17 Gy cm2, respectively.

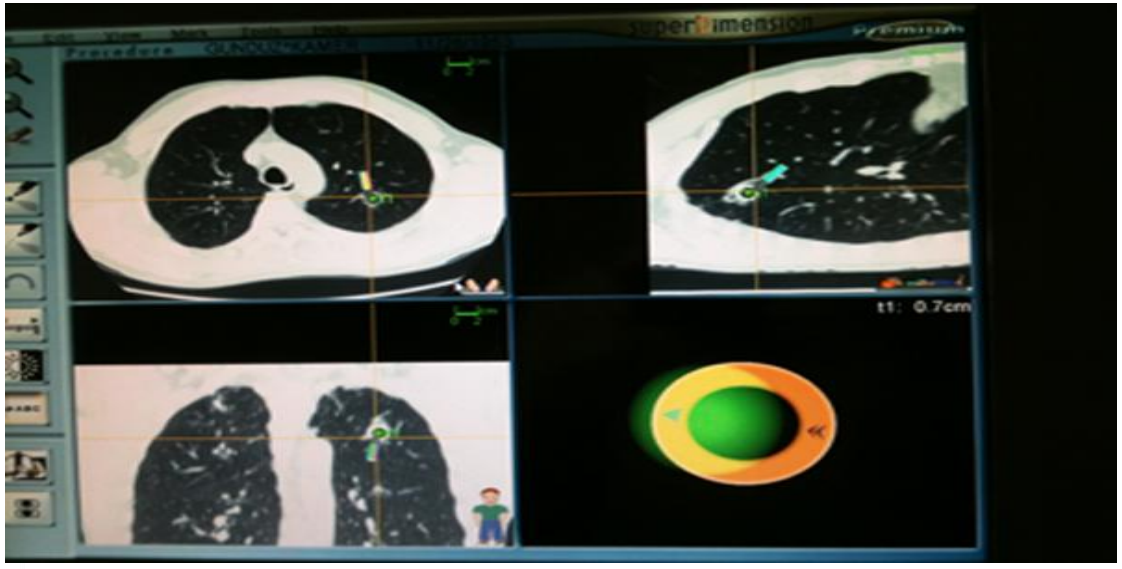
Conclusions: TBB using a combination of CBCT-AF and EBUS resulted in a satisfactory diagnostic yield and safety.

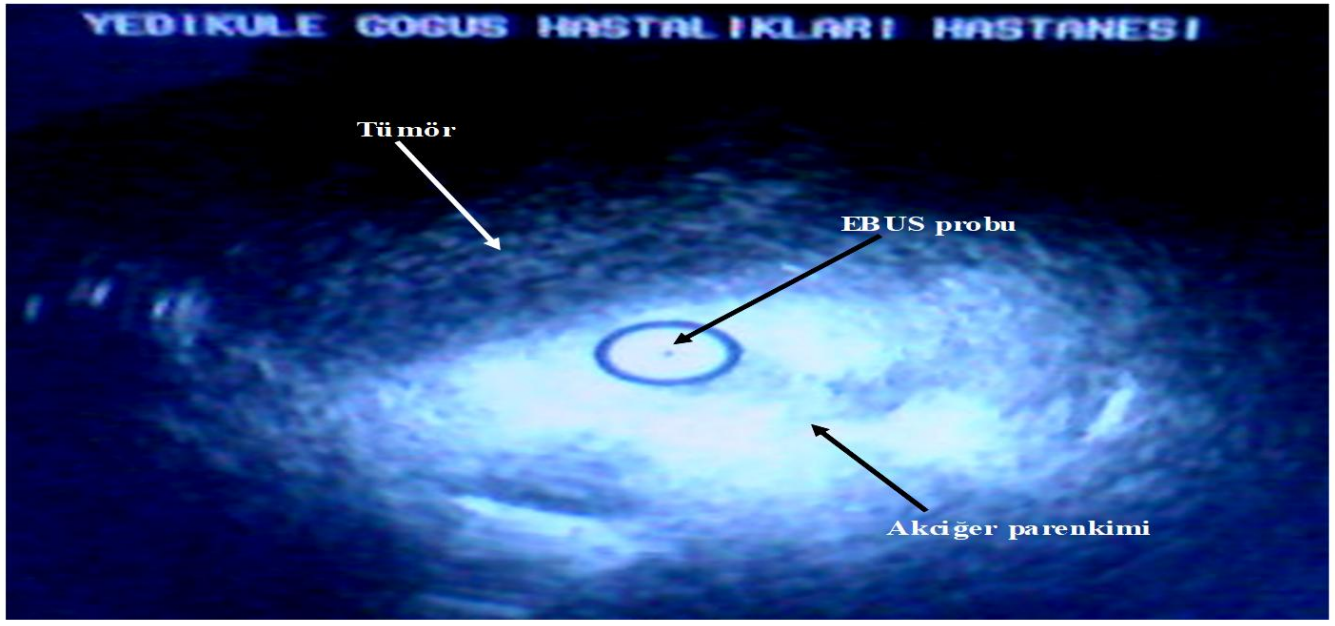

A
B
Spin: 0
Tilt: -0
A
C
Spin: -0
Tilt -90
D
Spin: -90
Tilt: -0

Elektromagnetik navigasyon +EBUS OLGU









ENB-Tedavi

- **Endoluminal Brakiterapi**
- **18 inoperabl periferik akciğer kanserli hasta**
- **ENB ile lezyona ulaşıldıktan sonra EBUS ile konfirmasyon**
- **Brakiterapi kateterinin yerleştirilmesi**
- **9 hastada tam yanıt, 9 hastada parsiyel yanıt**

Becker HD, et al: Electromagnetic navigation and endobronchial ultrasound for brachytherapy of inoperable peripheral lung cancer. Chest 2008; 134:396

Ablative technique	Ablation followed by surgical resection	Region	ClinicalTrials.gov identifier
PDT	No	United States, Canada	NCT02916745
PDT	Yes	United States	NCT03344861
PDT	No	Taiwan	NCT03211078
TVA	Yes	Australia	NCT03198468
TVA	No	Austria, Italy	NCT03514329
BLITT	Yes	United States	NCT03707925
RFA	No	China	NCT03009630
RFA	Yes	China	NCT03272971
RFA/MWA	No	China	NCT02972177
MWA	No	United States	NCT03713099
MWA	No	United Kingdom	NCT03569111

> Respiration. 2015;90(1):47-55. doi: 10.1159/000430825. Epub 2015 May 30.

Bronchoscopy-Guided Cooled Radiofrequency Ablation as a Novel Intervention Therapy for Peripheral Lung Cancer

Tomonobu Koizumi [1], Kenji Tsushima, Tsuyoshi Tanabe, Toshihiko Agatsuma, Toshiki Yokoyama, Michiko Ito, Shintaro Kanda, Takashi Kobayashi, Masanori Yasuo

Background: Our previous animal and preliminary human studies indicated that bronchoscopy-guided cooled radiofrequency ablation (RFA) for the lung is a safe and feasible procedure without major complications.

Objectives: The present study was performed to evaluate the safety, effectiveness and feasibility of computed tomography (CT)-guided bronchoscopy cooled RFA in patients with medically inoperable non-small-cell lung cancer (NSCLC).

Methods: Patients with pathologically diagnosed NSCLC, who had no lymph node involvement or distant metastases (T1-2aN0M0) but were not surgical candidates because of comorbidities (e.g.,

- **T1 2N0M0**
- **20 hasta 28 ablasyon**
- **PFS 35 ay**
- **5 yıl sürvi %61**

required hospitalization but improved with conservative treatment. There were no other adverse events in the present study.

Conclusions: CT-guided bronchoscopy cooled RFA is applicable for only highly selected subjects; however, our trial may be an alternative strategy, especially for disease local control in medically inoperable patients with stage I NSCLC.

Original Article

Check for updates

Transbronchial microwave ablation of lung nodules with electromagnetic navigation bronchoscopy guidance—a novel technique and initial experience with 30 cases

Joyce W. Y. Chan[1], Rainbow W. H. Lau[1], Jenny C. L. Ngai[2], Carita Tsoi[3], Cheuk Man Chu[3], Tony S. K. Mok[4], Calvin S. H. Ng[1]

- **25 hasta 30 nodül**
- **Ortalama 15 mm**
- **Yarısı bronkus sign pozitif**
- **12 ay takip progresyon yok**

(bronchus sign positive) in only half of them. Technical success rate was 100%, although some nodules required double ablation for adequate coverage. Mean minimal ablation margin was 5.51 mm. The mean actual ablation zone volume was −21.4% compared to predicted, likely due to significant tissue contraction ranging from 0–43%. There was no significant heat sink effect. Mean hospital stay was 1.73 days, and only 1 patient stayed for more than 3 days. Complications included pain (13.3%), pneumothorax requiring drainage (6.67%), post-ablation reaction (6.67%), pleural effusion (3.33%) and hemoptysis (3.33%). After median follow up of 12 months, none of the nodules had evidence of progression.

Conclusions: Bronchoscopic transbronchial microwave ablation is safe and feasible for treatment of malignant lung nodules. Prospective study on clinical application of this novel technique is warranted.

Photodiagnosis and Photodynamic Therapy 43 (2023) 103683

Contents lists available at ScienceDirect

Photodiagnosis and Photodynamic Therapy

journal homepage: www.elsevier.com/locate/pdpdt

Novel light delivery method for performing transbronchial photodynamic therapy ablation to treat peripheral lung cancer: A pilot study

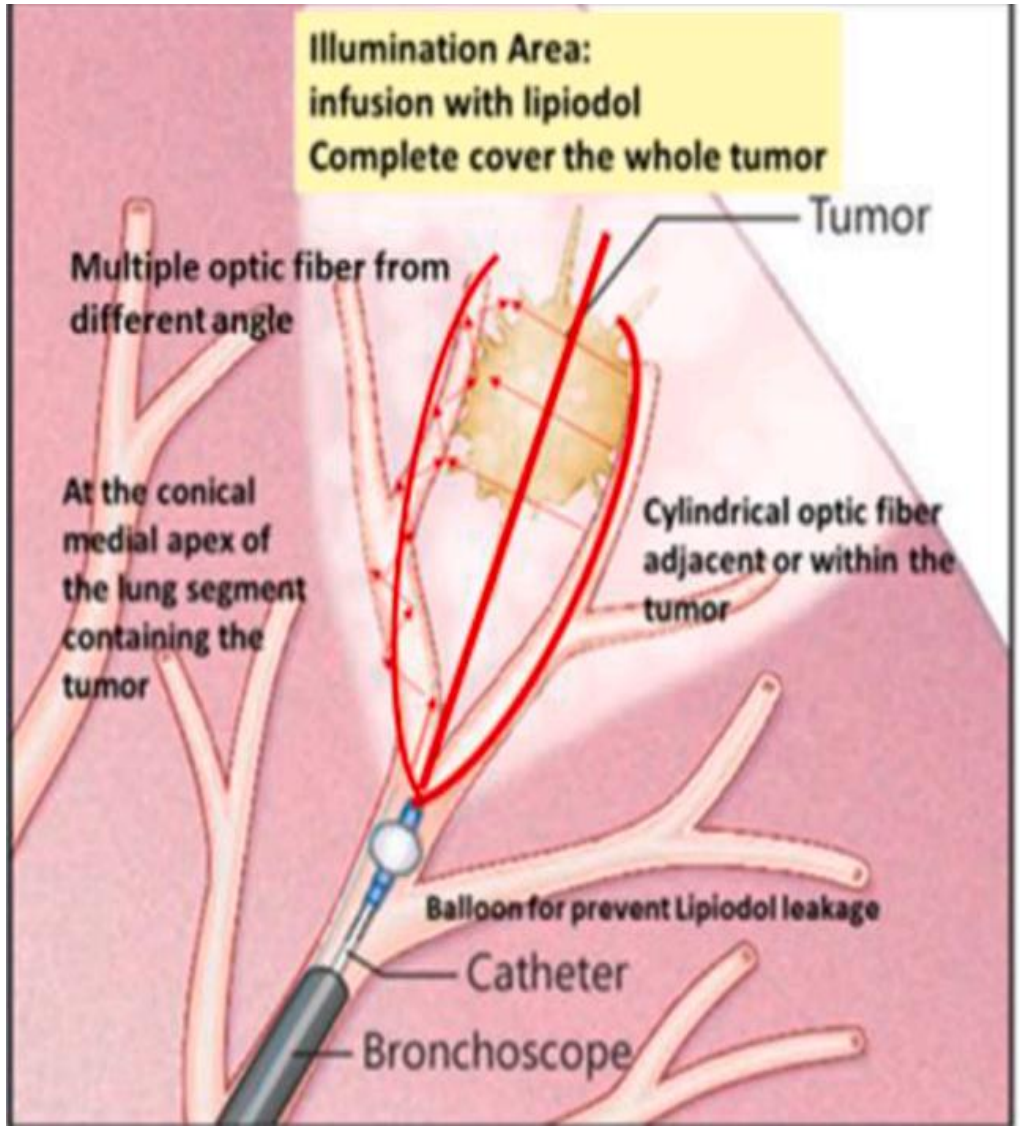
Hwailuh Chang [a], Yu-Chi Chiu [b], Shih-Wei Lee [b], Chu-Cheng Yen [c], Jih-Tung Pai [d], Cho-Yin Lee [e], Yen-Lin Wu [f], Chi-Ming Lee [f], Yei-San Hsieh [a,*]

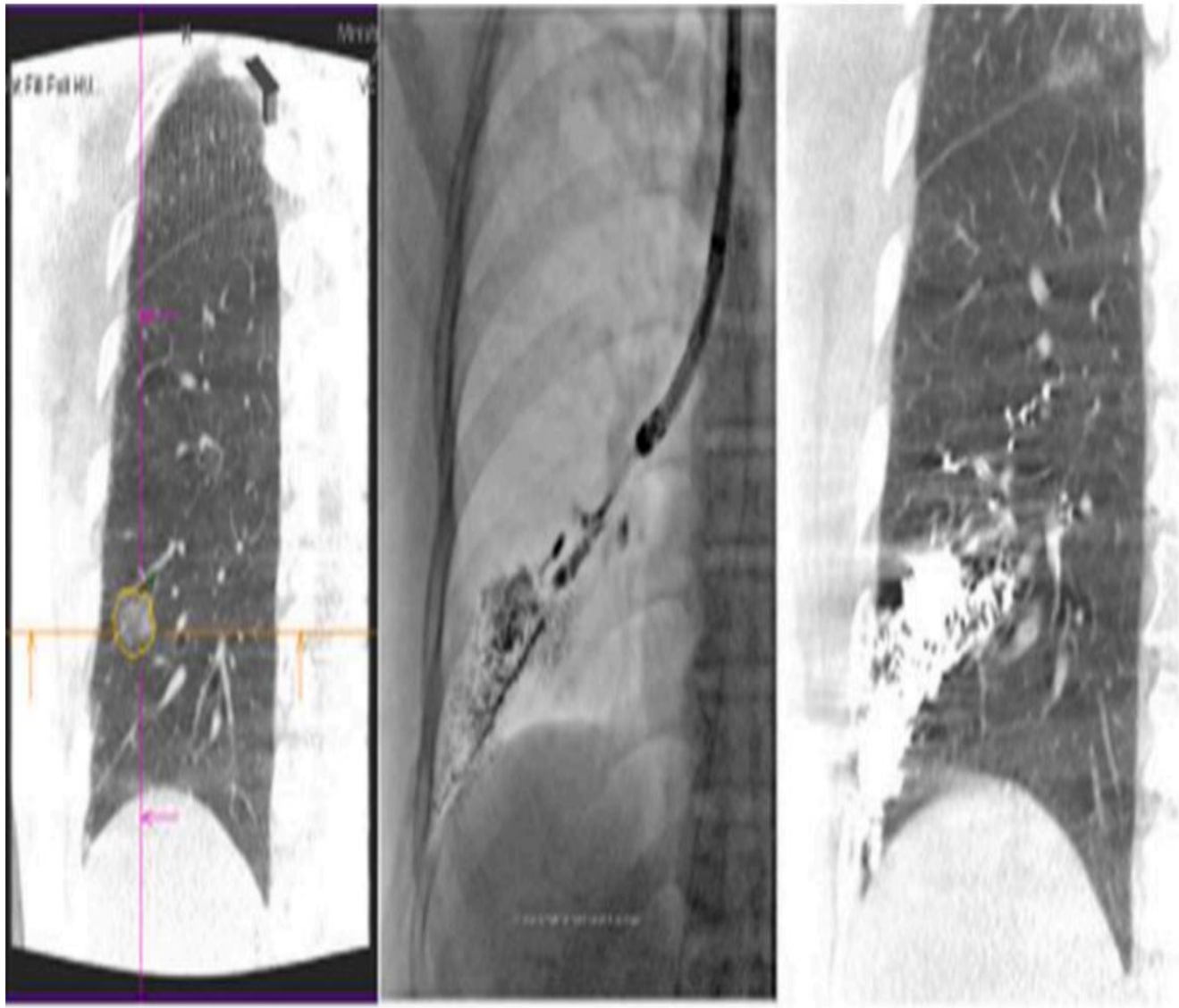
Background: Photodynamic therapy involves using a photosensitizer with l illumination and is recommended for treating early, centrally located lung cancers, but it is not a standard treatment for peripheral lung tumor.. We previously proposed a novel light delivery method, in which lipiodol is perfused into the bronchial tree to increase the scope of illumination via the fiber effect. Herein, we attempted this novel technique under electromagnetic bronchoscope guidance in a hybrid operation room where lipiodol facilitated light diffusion, and evaluated the effectiveness and feasibility of this technique for peripheral lung cancers.

Methods: This phase 0 pilot study included three patients with peripheral lung cancers (primary tumors ≤20-mm diameter). The photodynamic therapy was administered using Porfimer sodium as the photosensitizer, and an electromagnetic navigation bronchoscope in a hybrid operating room to guide the catheter to the tumor. This facilitated lipiodol infusion to encase the tumor and permit the transbronchial photodynamic therapy ablation.

Results: Administering 630 nm 200 J/cm (400mW/500sec) energy through a 3-cm cylindrical diffusing laser fiber was safe; no significant acute complications were observed. Although the treatment outcome was unsatisfactory due to the low light dose, tumor pathology in one case revealed tumor necrosis, with no significant damage to the surrounding lung tissue.

Conclusions: Novel light delivery transbronchial photodynamic therapy ablation for peripheral lung tumors is feasible and safe. Additional clinical trials may help determine the best illumination plan and light dose through


Illumination Area:
infusion with lipiodol
Complete cover the whole tumor
Tumor
Multiple optic fiber from different angle
At the conical medial apex of the lung segment containing the tumor
Cylindrical optic fiber adjacent or within the tumor
Balloon for prevent Lipiodol leakage
Catheter
Bronchoscope

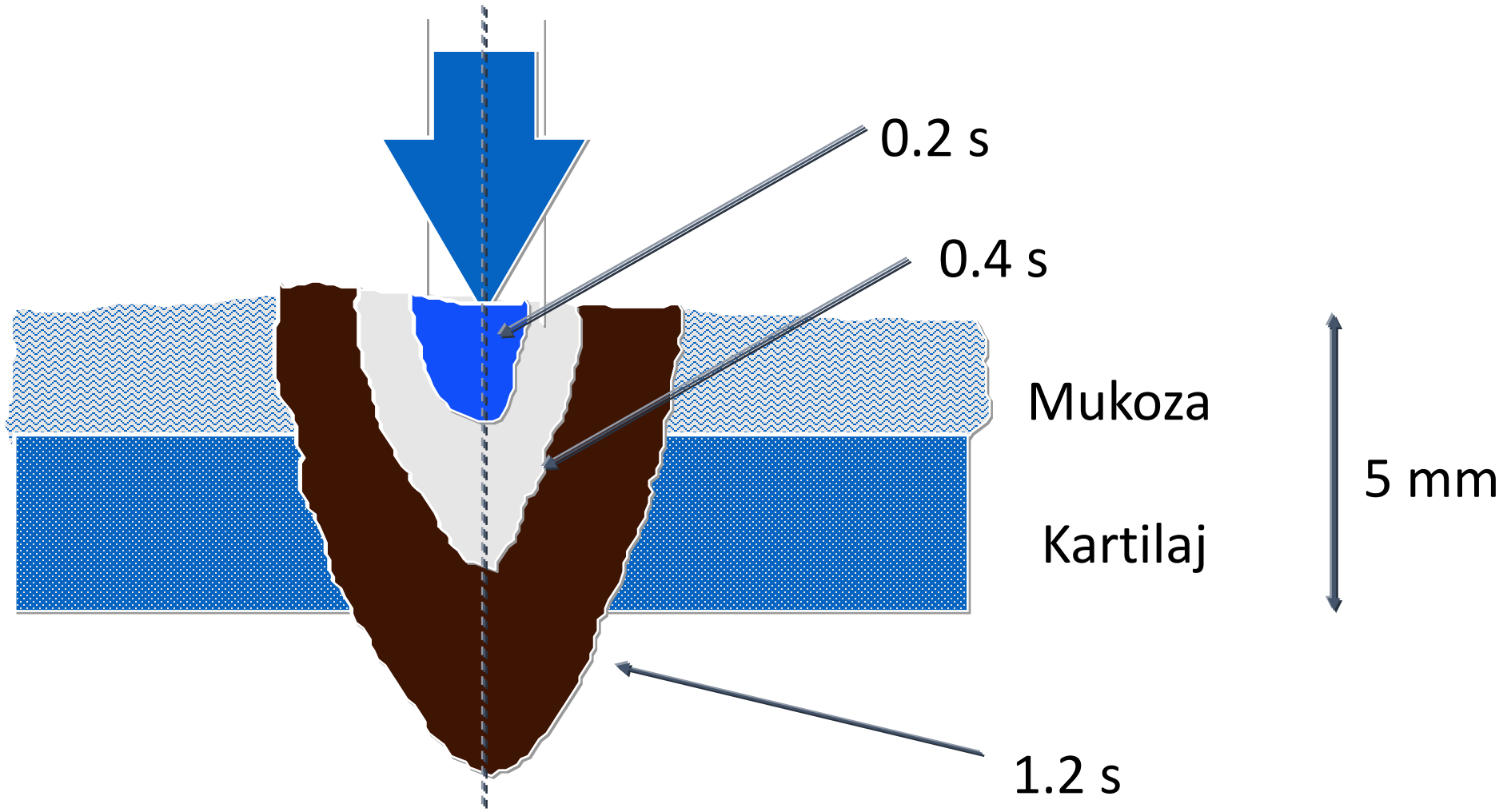


Review of current thermal ablation treatment for lung cancer and the potential of electrochemotherapy as a means for treatment of lung tumours

Saleem Jahangeer [1], Patrick Forde, Declan Soden, John Hinchion

Gelecekte….
(ClinicalTrials'da devam eden çalışmalar)

- Akciğer maligniteler için doğrudan endobronşiyal ablasyon tedavileri (mikrodalga, radyofrekans, termal, lazer, kriyosprey)
- Primer lezyonda radyasyona duyarlılığı artırmak için doğrudan nanopartikül enjeksiyonu
- Kanser hücre ölümünü arttırmak için enfeksiyöz virüslerin enjeksiyonu
- Kemoterapi ve diğer antineoplastik ajanların tümörlere doğrudan enjeksiyonu
- Pre ve peri-operatif nodül işaretleme



J.C Fisher 1983

PERİFERİK PULMONER LEZYONLAR

- **BRONKOSKOPİ**
  - ***Konvansiyonel FOB***
  - ***Fluoroskopi rehberliğinde TBBx***
  - ***EBUS rehberliğinde TBBx***
  - ***ENB rehberliğinde TBBx***
  - ***Ultrathin bronkoskopi***

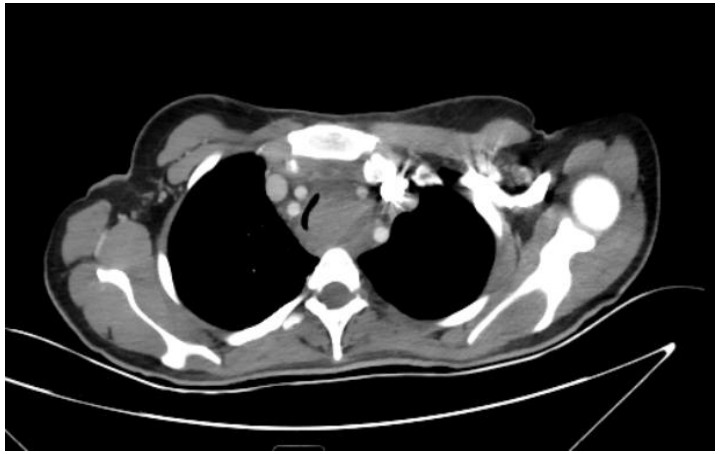
OLGU

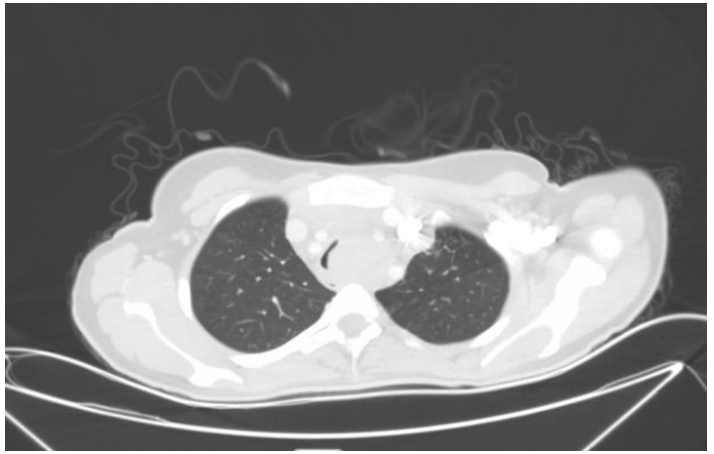
- 19 yaşında, kız
- Şikayeti: Öksürük, nefes darlığı, ses kısıklığı
- Hikayesi: 3 haftadır devam eden ses kısıklığı nedeni ile gittiği KBB hekimi tarafından servikal lenf nodu örneklenmesi planlanmış
- Ancak hasta bu süreçte ortaya çıkan ani nefes darlığı olması nedeni ile başvurduğu acilimizde interne edilmiş
- Özgeçmiş: Bir özellik yok

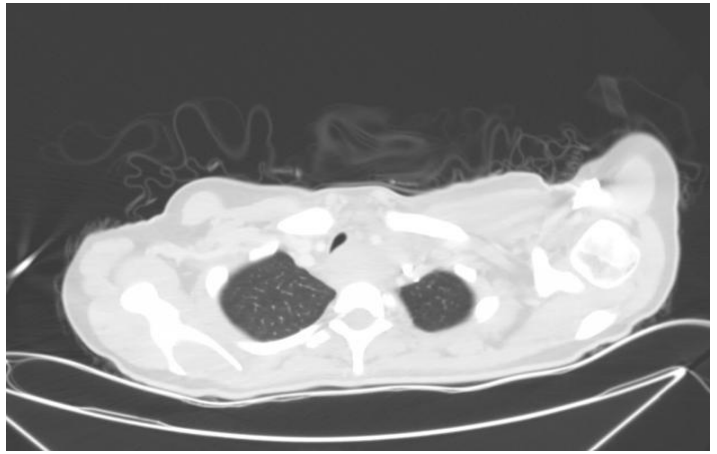
OLGU

- Alışkanlık: Yok
- Başvuru AKG: PH: 7.46 SO2: 80
  PCO2: 27 PO2: 56
- Hasta GBİ için yatışı esnasında solunum sıkıntısının artması üzerine acil olarak GP ünitemizde işleme alındı, işlem esnasında sol servikal lenf nodundan örnekleme yapıldı

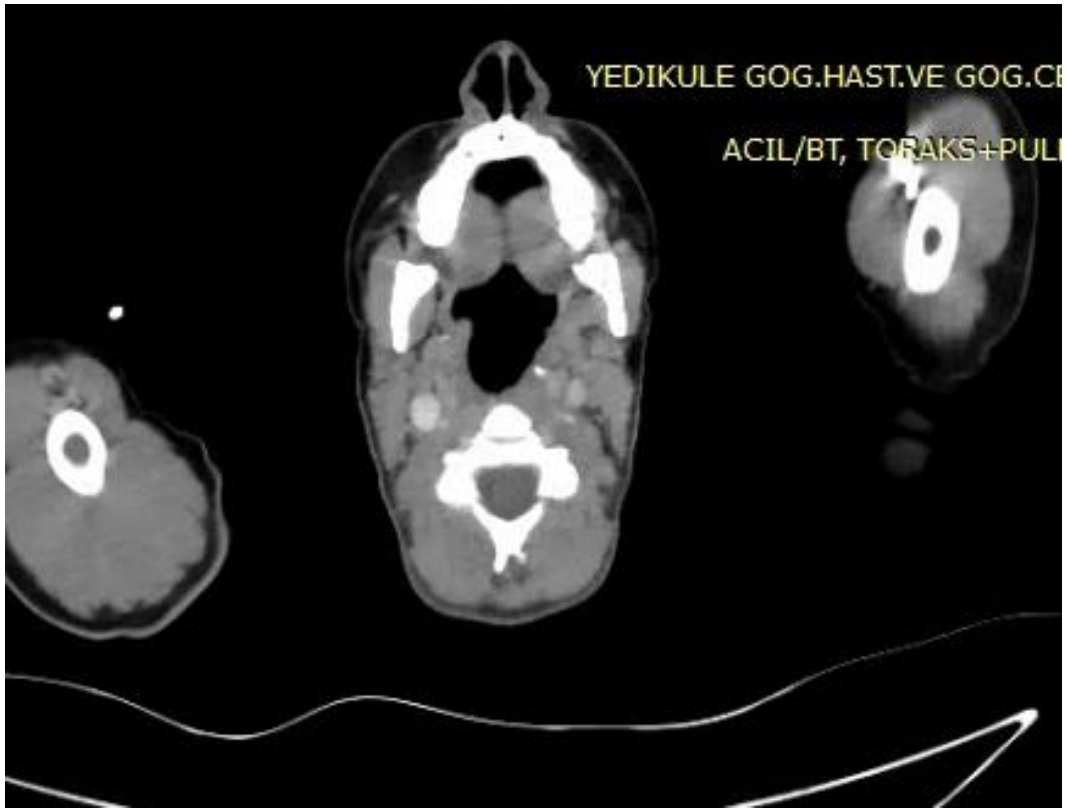
PA AKCİĞER GRAFİSİ





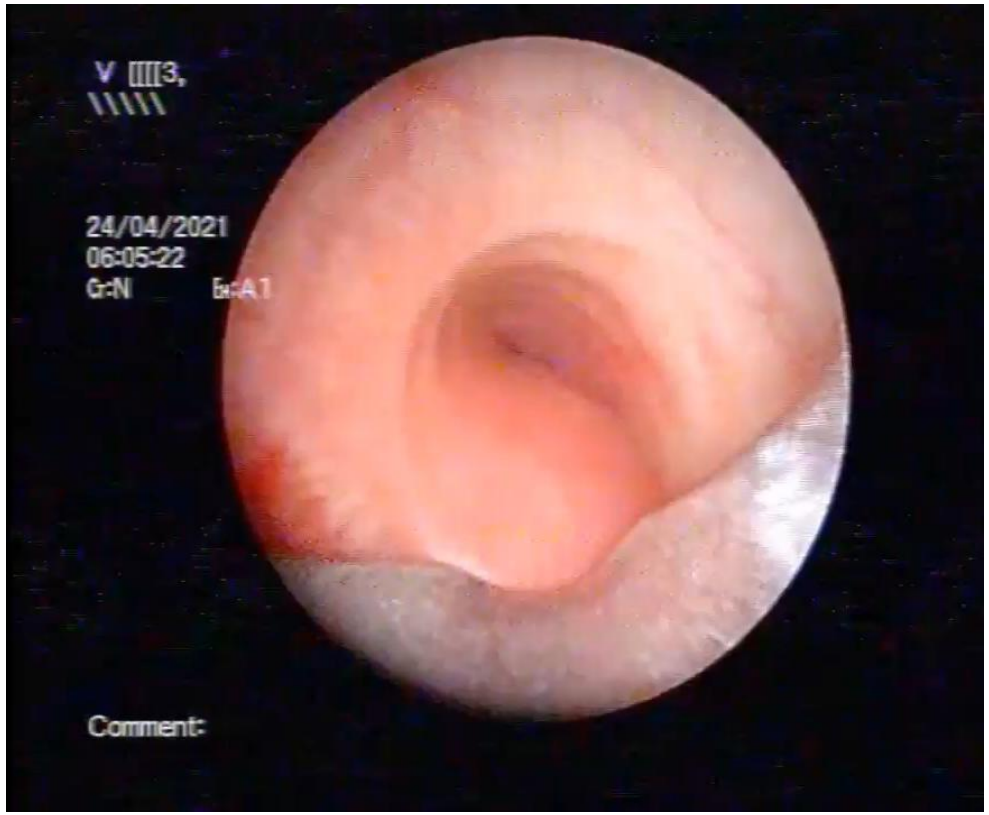


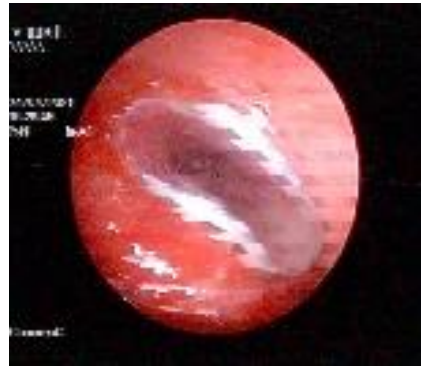
TORAKS BT



OLGU

RİJİD BRONKOSKOPİ



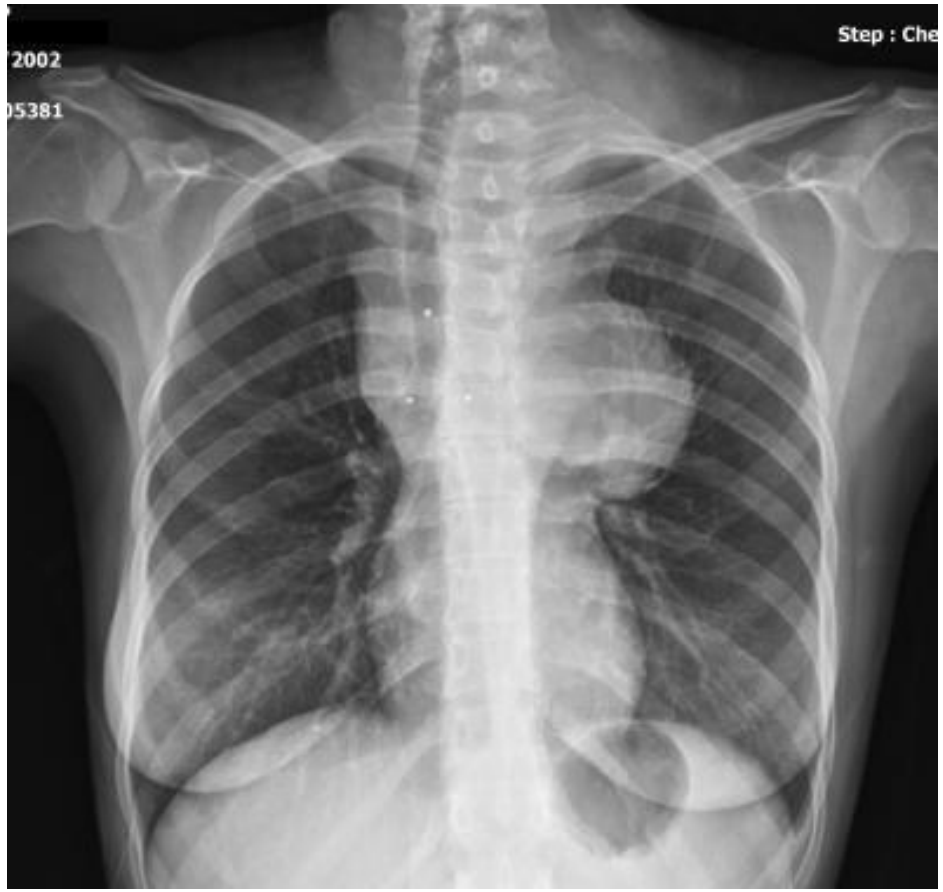


OLGU

- **TAKİP:**

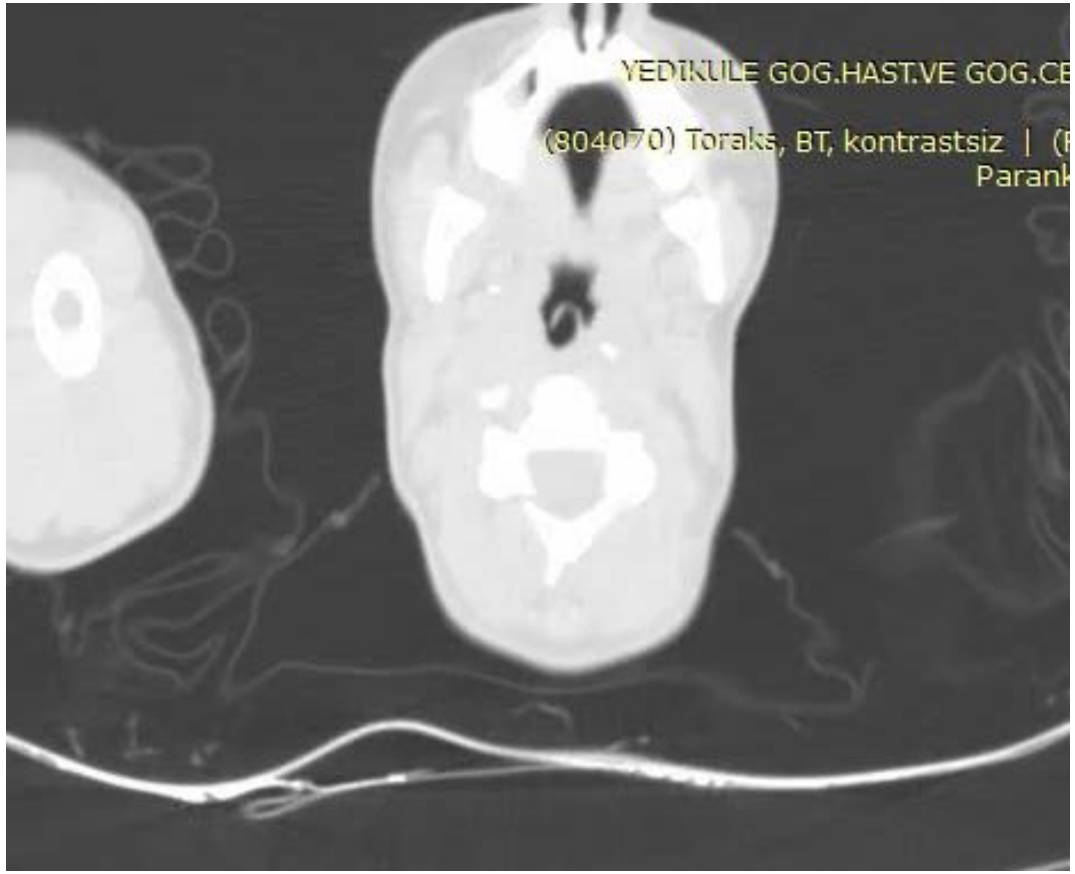
- Patoloji: Hodgkin Lenfoma

- Onkolojik tedavisi : 4 kür ABVD KT
  2 kür BEACOPP KT



İŞLEM SONRASI AKCİĞER GRAFİSİ

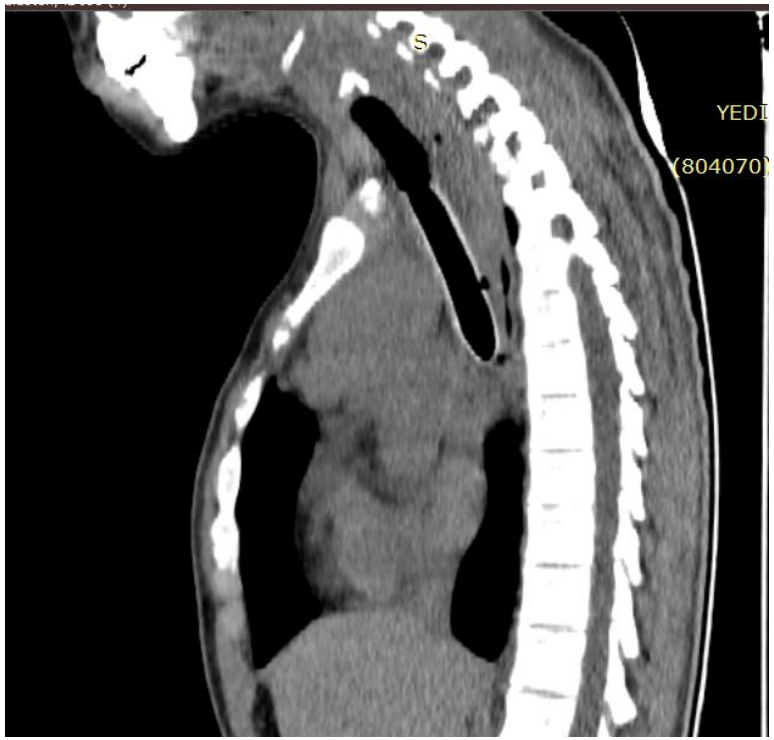
OLGU



İŞLEM SONRASI TORAKS BT

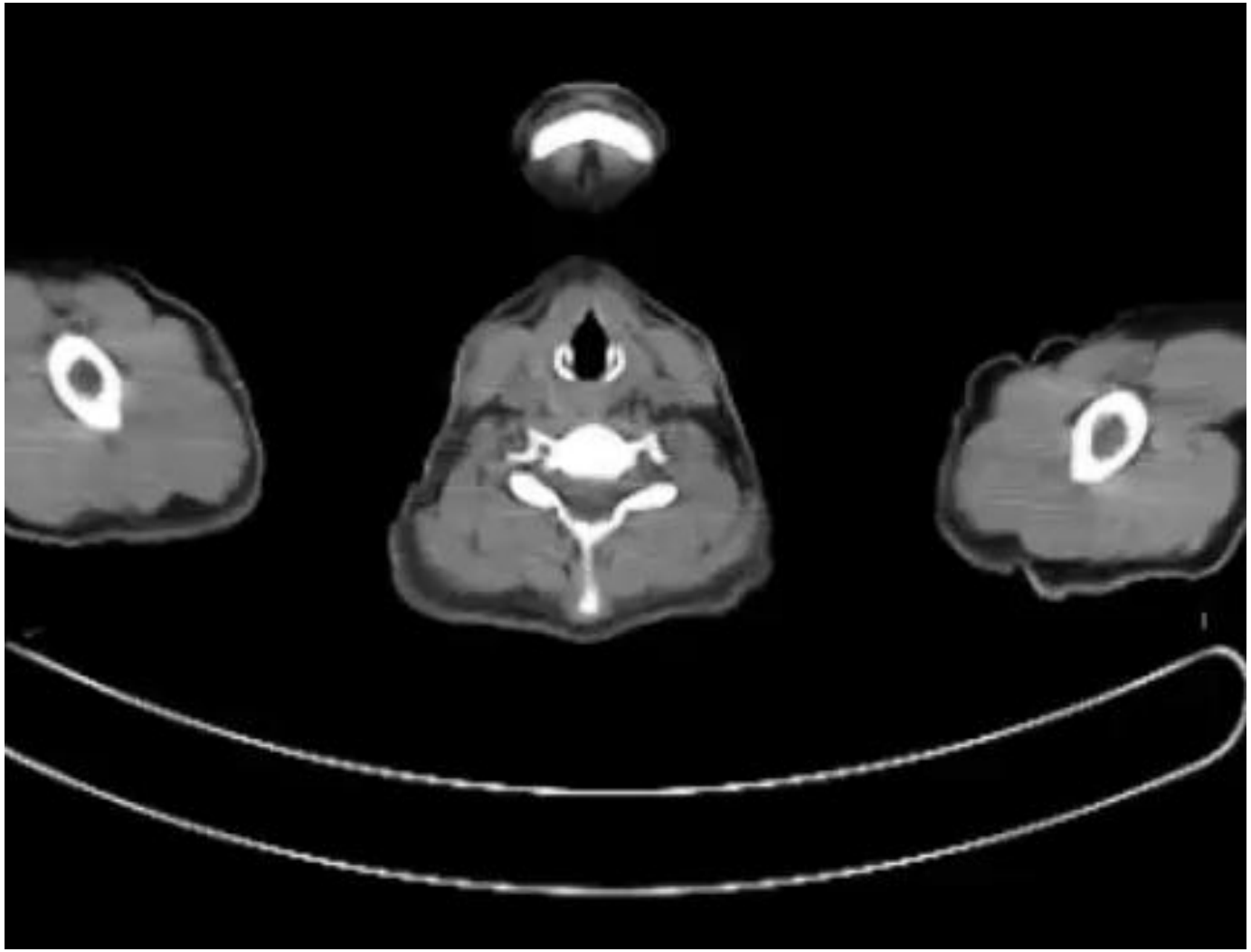
OLGU

İŞLEM ÖNCESİ



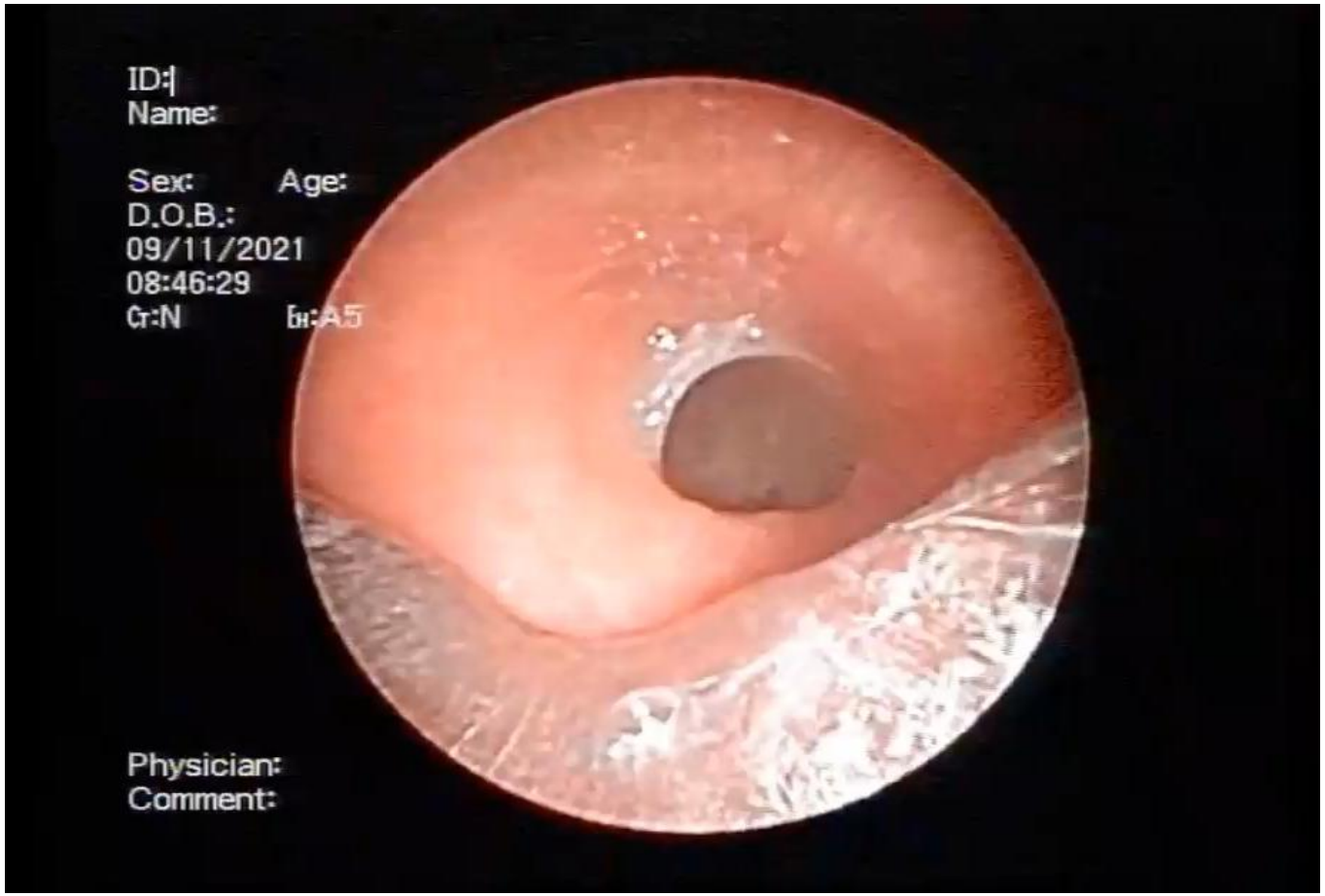
İŞLEM SONRASI

OLGU



KT SONRASI TORAKS BT

OLGU



Onkoloji tarafından RT planlanan hasta tedavisini almak üzere yönlendirildi

STENT ÇIKARMA (İLK İŞLEMDEN 6 AY SONRA)

OLGU

- 48 yaş, erkek hasta
- Şikayet: Ağızdan kan gelmesi, nefes darlığı
- Hikaye: 2015 yılında akciğer ca nedeni ile sağ pnömonektomi ve sonrasında RT almış. 6 aydır giderek artan nefes darlığı olan hastanın 1 aydır ara ara öksürmekle ağızdan kan gelmesi mevcut. EBT açısından değerlendirilmek üzere şehir dışından sevk edilen hasta interne edildi
- Özgeçmiş: Akc ca
- Alışkanlıkları: 20 paket/yıl sigara, 5 yıldır exsmoker

OLGU

- Fizik Muayene: TA: 100/60 mmHg, N: 94/dak,
  SO2: 92 (oda havası)
  Genel durumu kötü
  Solunum sistemi: Takipneik, sağda solunum sesleri alınamıyor
- Laboratuvar:

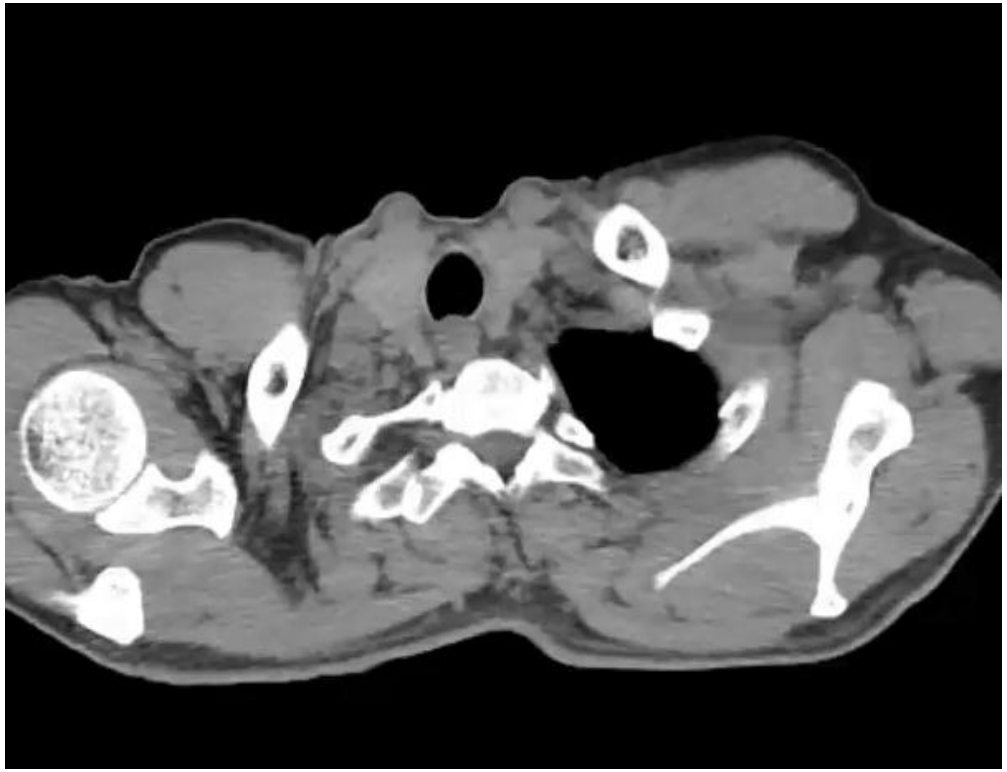
Hemogram
Hb: 15.7 g/dL
HCT: 45.3 %
PLT: 349 10e3/uL
WBC: 10.14 10 e3/uL

Biyokimya
Glu: 124 mg/dl
Üre: 13 mgr/dl
Kre: 0.72 mg/dl
AST: 15 U/L
ALT: 11 U/L
Na: 137 mEq/L
K: 3.5 mmol/L
INR: 0.9
CRP: 7.6 mg/L

OLGU

İşlem öncesi PA Akciğer Grafisi

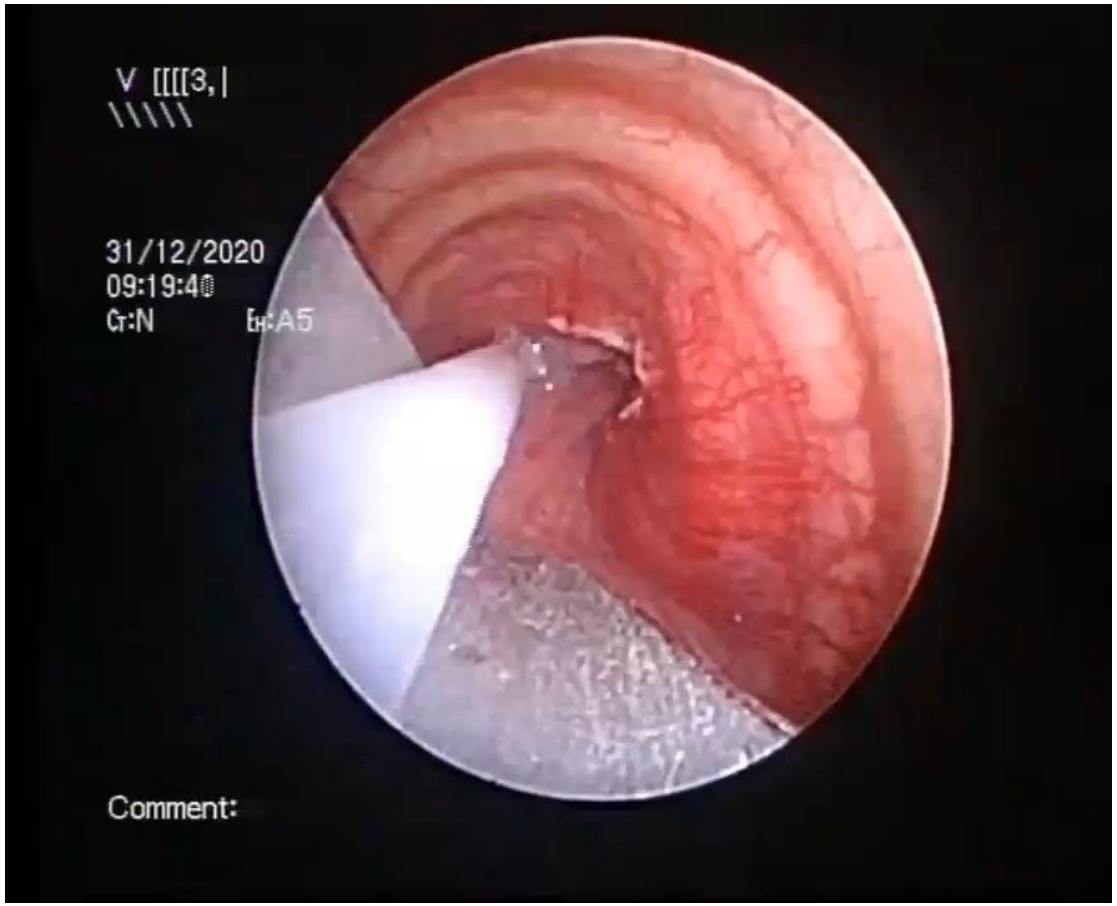
OLGU

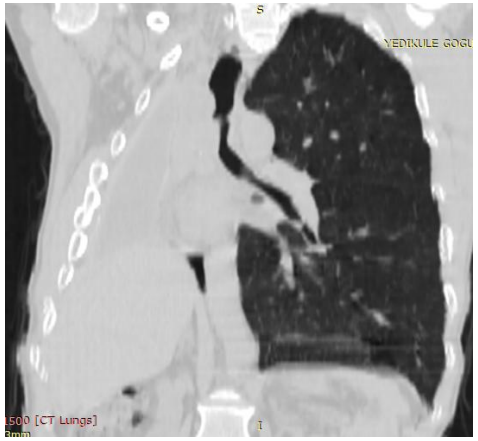


TORAKS BT

OLGU

RİJİD BRONKOSKOPİ





OLGU

PATOLOJİ

Histopatalojik Tanılar / Sitopatolojik Tanılar

Trekea; Endobronşial Kitleden Biopsi: Küçük hücreli dışı karsinom

İmmunhistokimya Boyama Panel Sonuçları

PATOLOJİ İMMÜNOHİSTOKİMYA UYGULAMASI

MATERYAL	: 8745/2020 Parafin blok
PATOLOJİK TANI	: Bkz tanı.
YÖNTEM	: OTOMATİZE, Ventana Bench Mark Ultra İmmünhistokimyasal cihazı
TEKNİK	: Multimer teknoloji Ultra View Universal DAB Detection Kit 5269806-760-500
KONTROL	: (+)

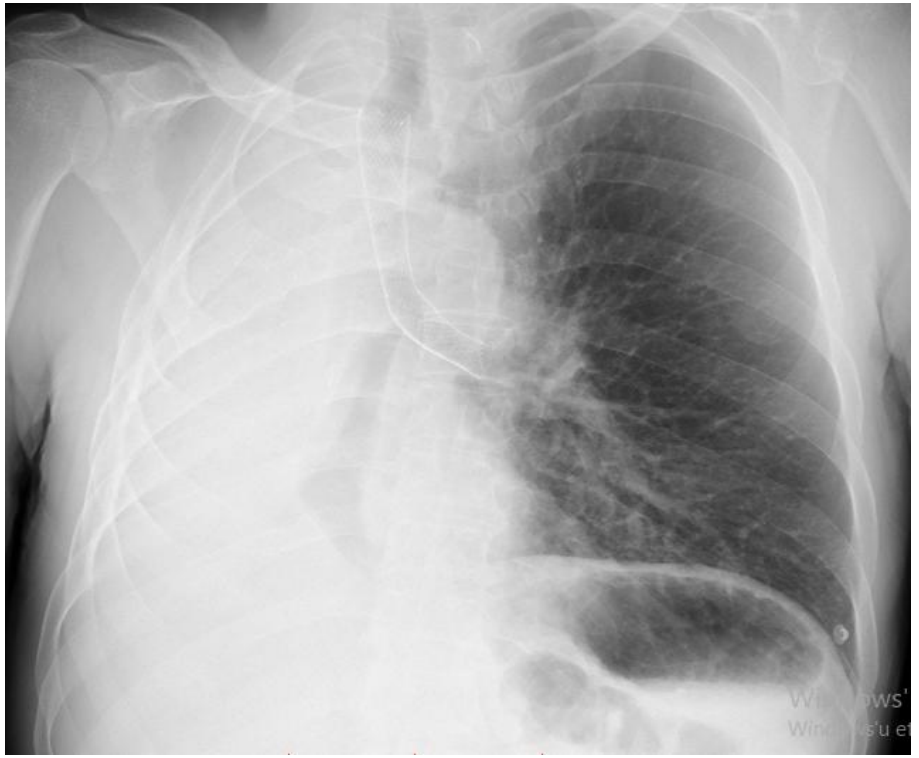
PRİMER ANTİKOR	**İMMÜNREAKTİVİTE**
Pansitokeratin Ventana	Pozitif
Anti-P40(BC28) Ventana	Pozitif
TTF-1 (8G7G3/1) Ventana	Negatif

Morfoloji Bilgileri

8070/3 Skuamoz hücreli karsinom, NOS,

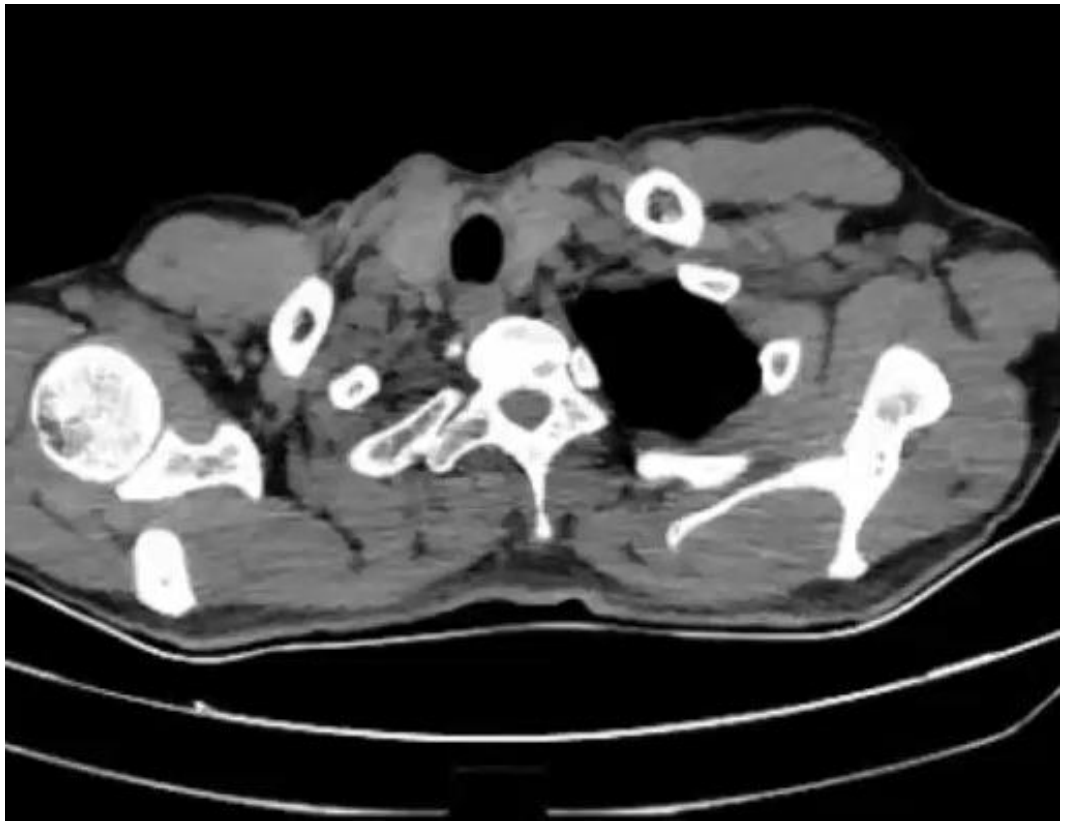
OLGU

Stentleme öncesi PA Akciğer Grafisi



Stentleme sonrası PA Akciğer Grafisi

OLGU



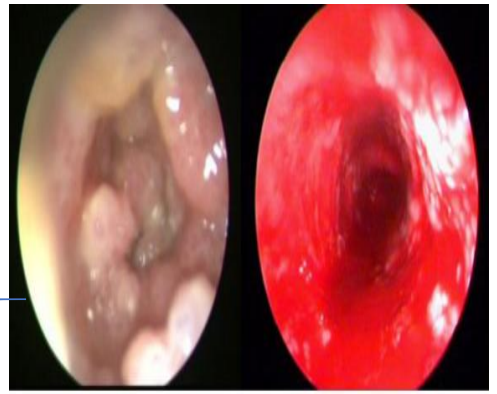
Stentleme sonrası Toraks BT

NADİR NEDENLER

- Relapsing polikondrit
- Trakeaosteokondroplastika
- Trakeal amiloidoz
- Trakeal papillom
- Polianjitisli granülom (Wegener)

PM (-)

PM (+)

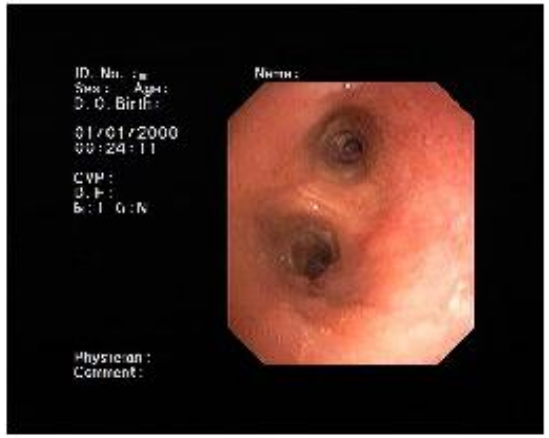


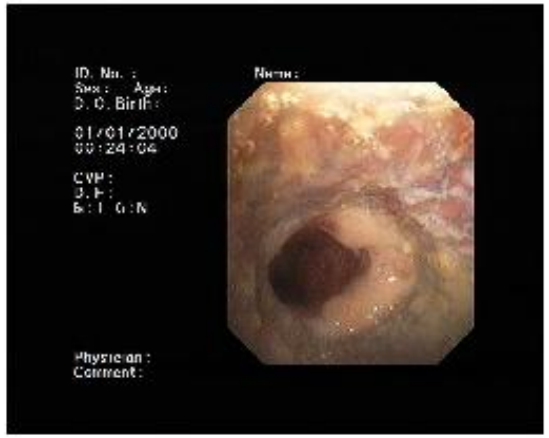
OLGU

- Hastanın genel durumu hızla düzeldi.
- Solunum sıkıntısı düzeldi
- Beslenmeye başladı, öz bakımı arttı

ANCAK

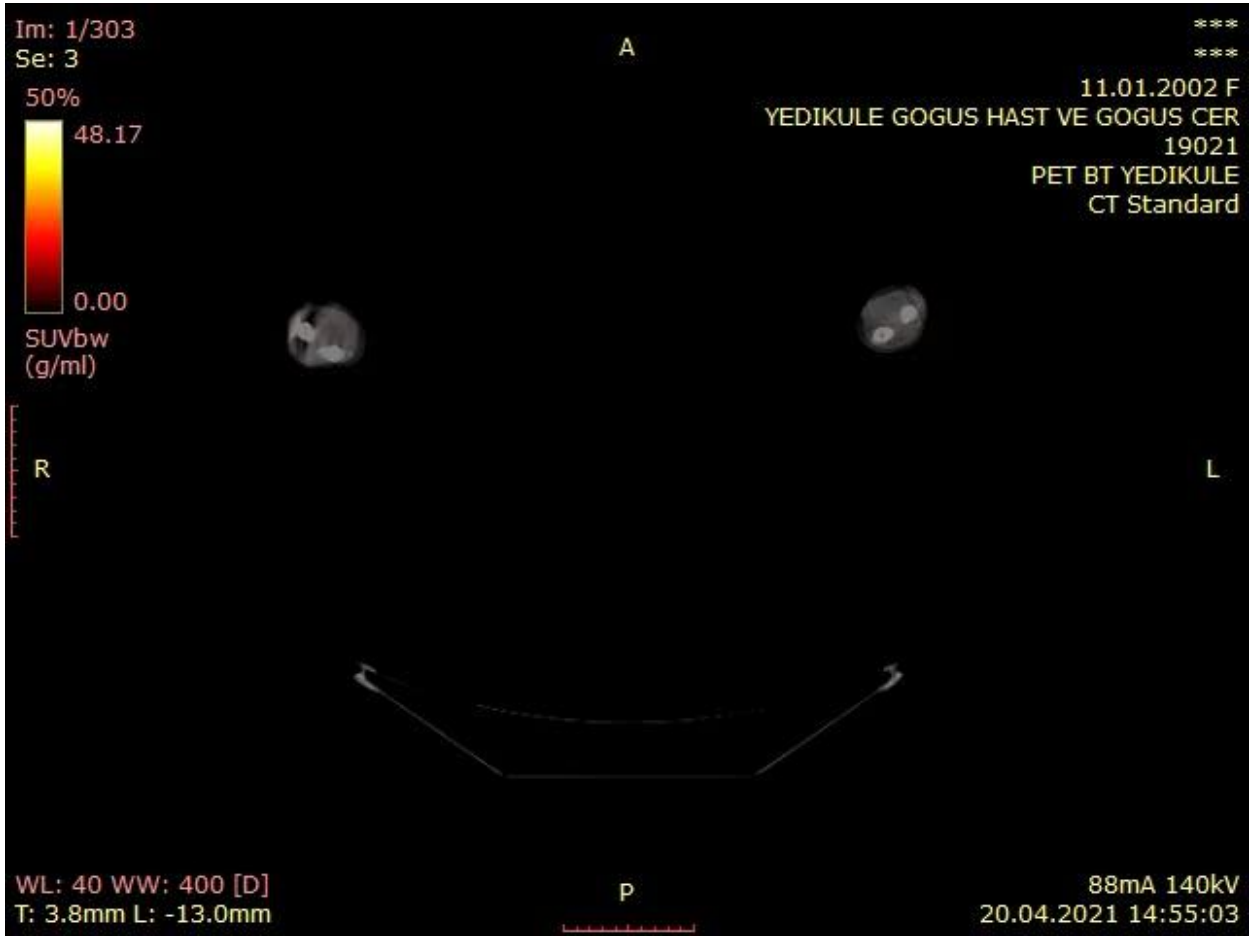
- 4 ay sonra beslenememe ve hızlı kilo kaybı nedeni ile tekrar başvurdu. Solunumsal sıkıntısı yoktu





4 ay sonrası PA Akc grafi ve bronkoskopi görüntüleri

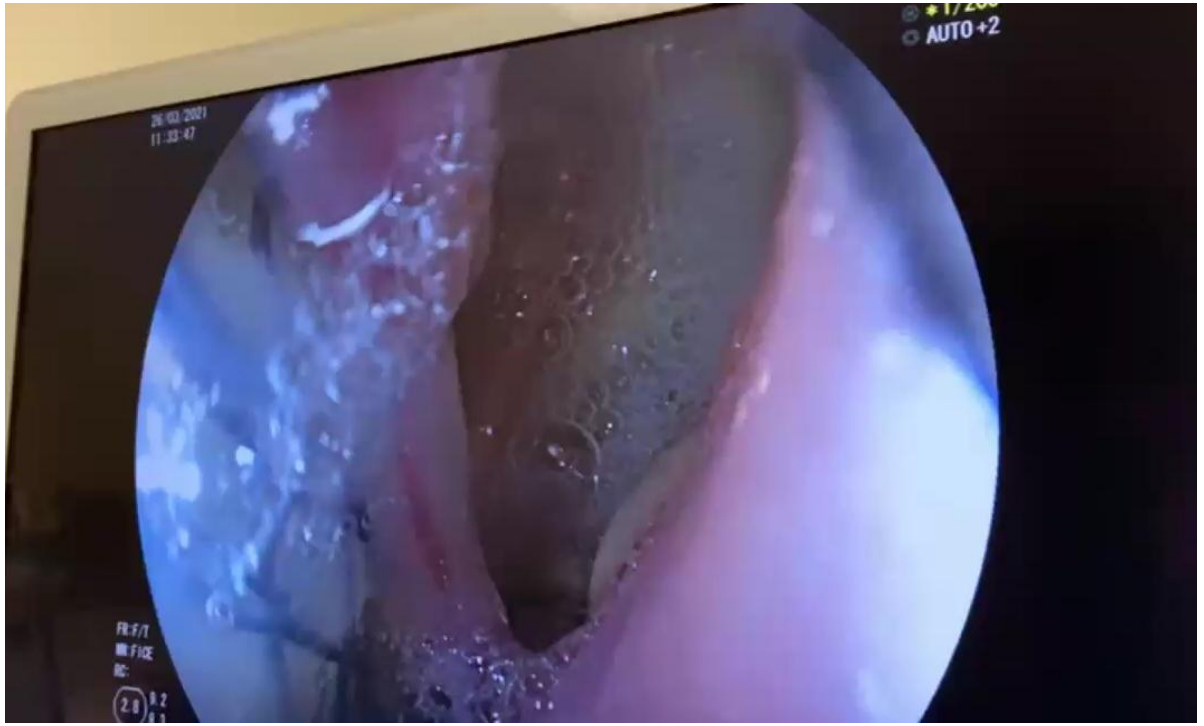
OLGU 2



TÜM VÜCUT PET-BT

OLGU

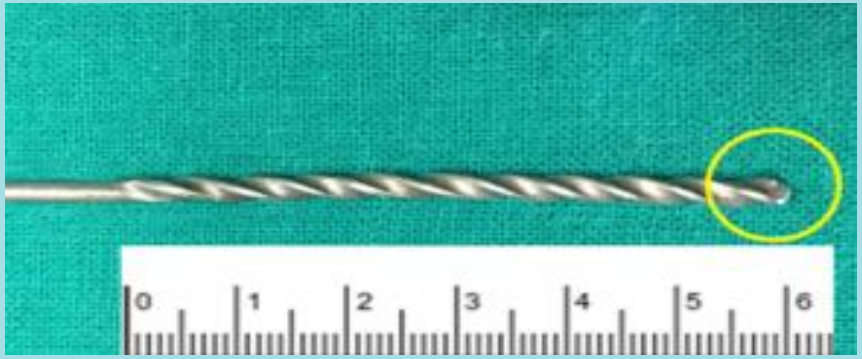
- Endoskopi: Trakeadaki stentin ösefagusa girerek lümeni tam obstrükte ettiği görüldü. Darlığın distaline geçilemedi.
- Hastaya PEG açılmak üzere multidisipliner hastaneye sevk edildi



TEDAVİ- Hava yolu açıklığını sağlamak

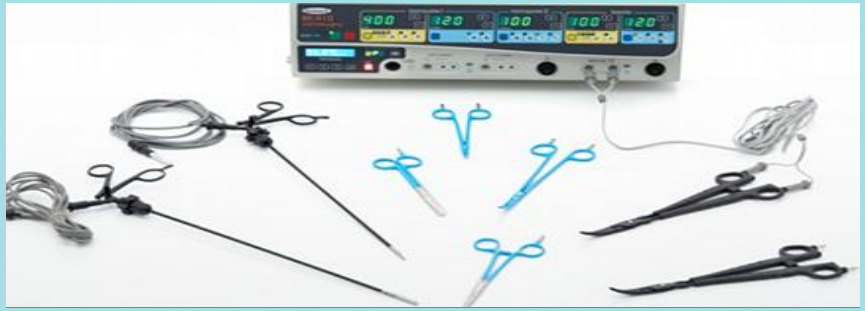
Mekanik Dilatasyon:

Rijid tüpün kendisi
Balon
Buji
Kesi
Drill



Sıcak Yöntemler:

Argon Plasma Koagülasyon
LASER
Elektrokoter



Soğuk Yöntemler:

Kriyo

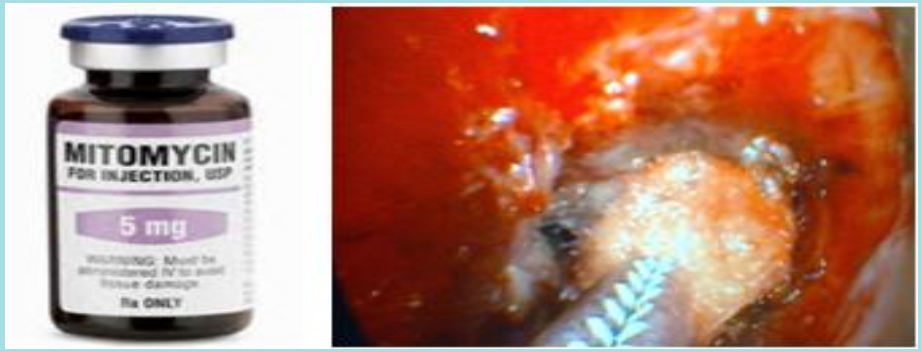
TEDAVİ- Hava yolu açıklığını devam ettirme

Stentler: Şekil

Uzunluk

Materyal

Mitomisin- C:



Steroidler:

SANTRAL HAVA YOLU OBSTRÜKSİYONLARI

MALİGN HAVA YOLU OBSTRÜKSİYONLARI

BENİGN HAVA YOLU OBSTRÜKSİYONLARI

- Post-travmatik hava yolu obstrüksiyonları
- Dinamik ekspiratuar darlık
- Dış bası
- Cerrahi sonrası
- Enfeksiyonlar
- İnflamatuar havayolu hastalıkları
- Benign endobronşiyal tümörler

- **Benign endobronşiyal tümörler**
  - Respiratuar papillomatozis
  - Hamartom
  - Leiomiyom
  - Lipom
  - Fibrom
  - Nörojenik tümör
  - Pleomorfik adenom
  - Onkositom
  - Trakeobronkopatia osteokondroplastika

Girişimsel Pulmonolojide Endobronşiyal Tedavi Endikasyonları

- Tümör tedavisi
- Bening hava yolu stenozları
- Malign hava yolu stenozları
- Hemoptizi
- Bronkoskopik hacim azaltıcı tedaviler
- Yabancı cisimler

Endobronşiyal tedavi yöntemleri

- **Sıcak yöntemler**
  - **Elektrokoter,**
  - **Argon plazma koagulasyon(APC),**
  - **Lazer**

- **Soğuk yöntemler**
  - **Kriyoterapi**

- **Rijid bronkoskopla mekanik temizleme**
- **Dilatasyon**

- **Endobronşiyal stent uygulanması**

- Brakiterapi
- Fotodinamik tedavi

Endobronşiyal tedavi yöntemleri

Mekanik debulking

Laser, APC

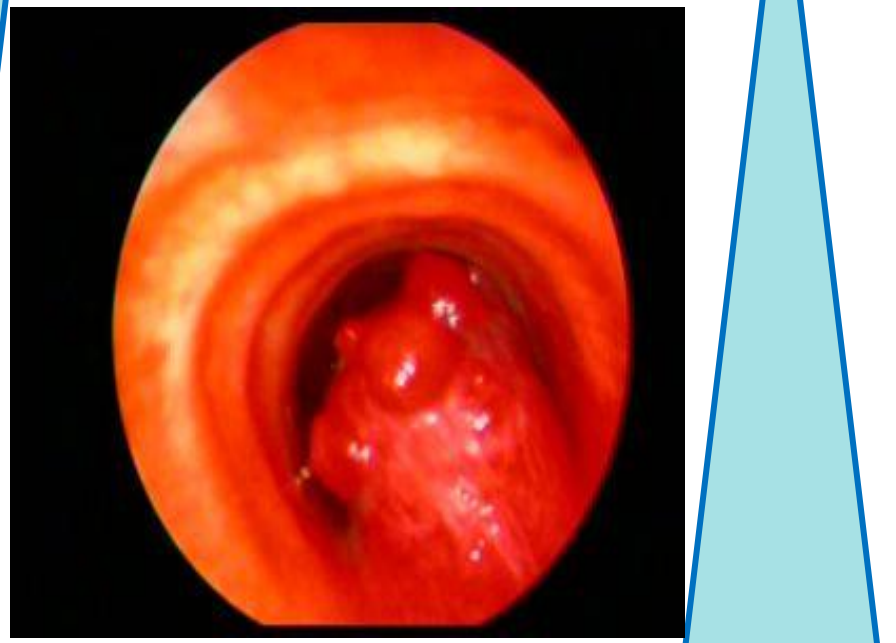
Stent

PDT

Kriyoterapi

Hızlı etki

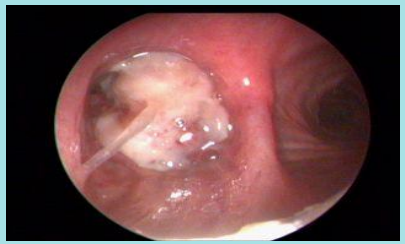
Yavaş etki

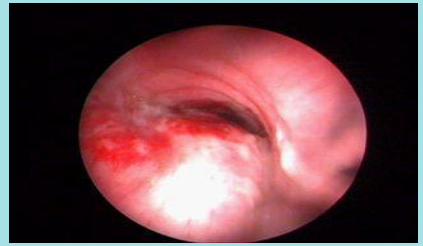


MALİNG HAVA YOLU OBSTRÜKSİYONU

ACİL RİJİD

ACİL DEĞİL FOB YA DA RİJİD



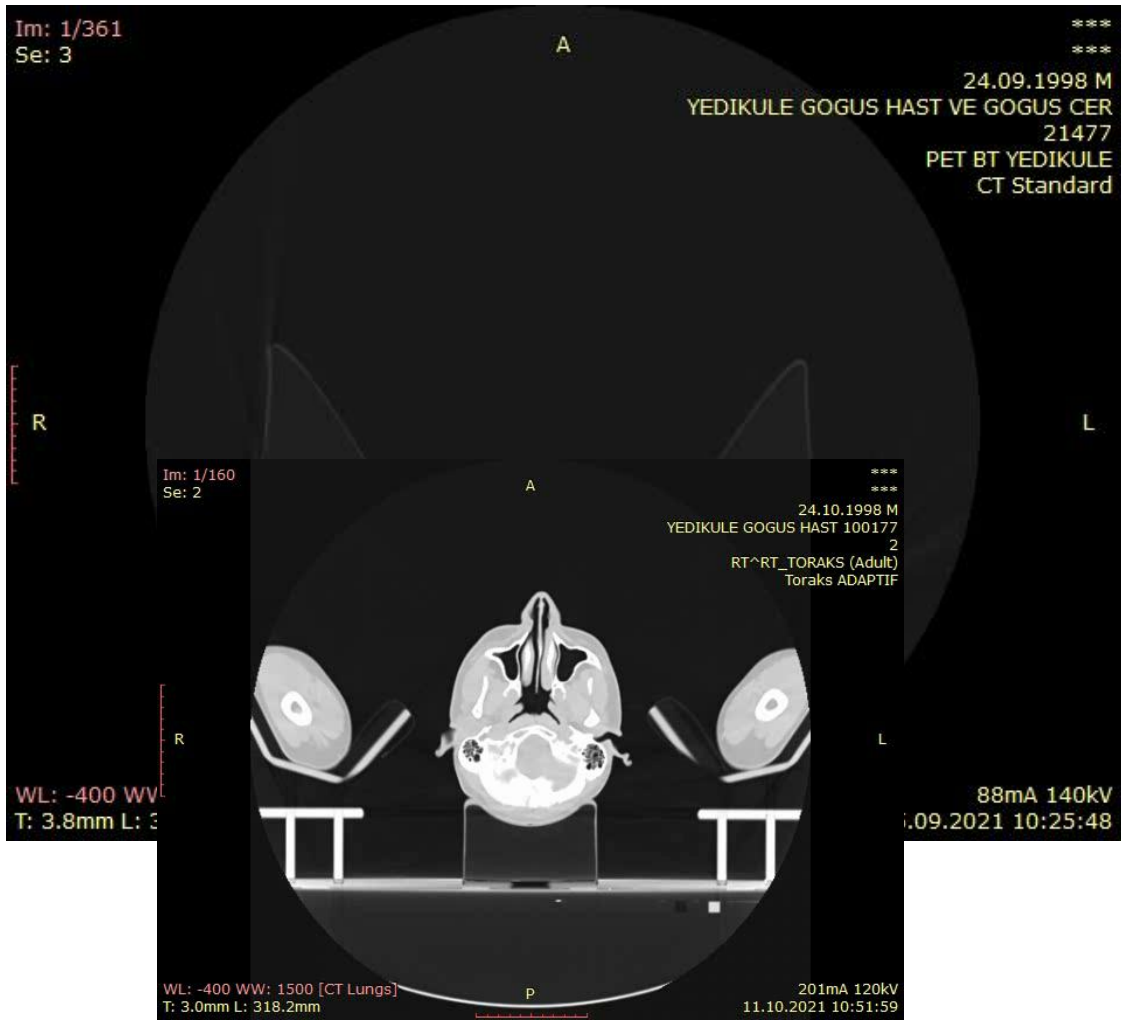


ABLATİF TEKNİKLER VE MEKANİK REZEKSİYON

STENT

OLGU 1

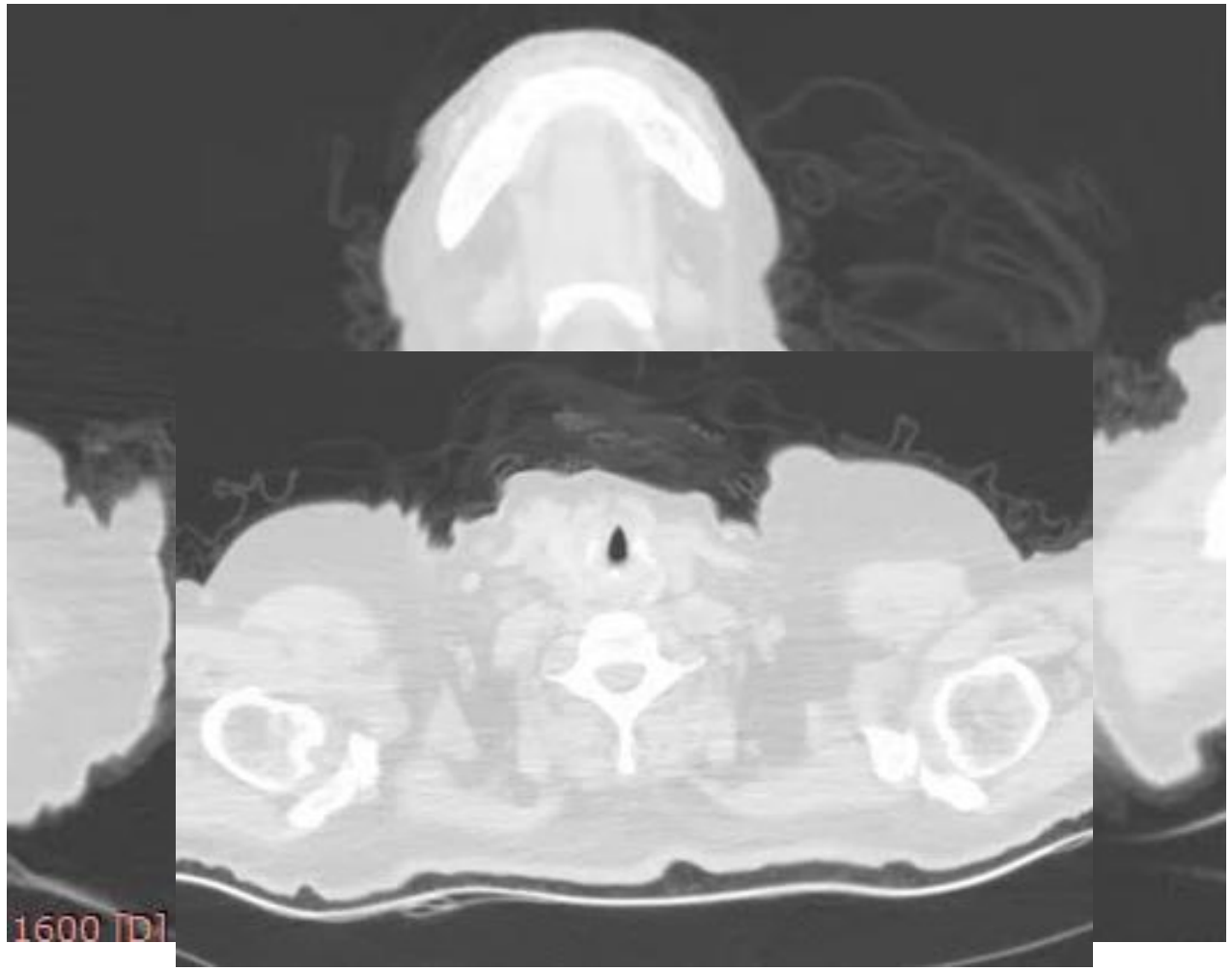
- Özgeçmiş: Ewing sarkomu (2018)
- Alışkanlık: 4p/yıl sigara, aktif içici
- Fizik muayene:
  TA: 110/80 NDS: 130/dak
  Sat: %94(oda) SDS: 30/dak
  Solunum sistemi: Yaygın stridor(+)
- Laboratuar:
  WBC: 14.39 10e3/uL PLT: 579 10e3/uL
  CRP: 132 mg/dL AST: 46 U/L ALT: 62 U/L
  Potasyum: 5.3 mmol/L



TORAKS BT

OLGU 2

- Hasta anestezi ve kardioloji konsültasyonları sonrası GBİ'e alındı
- İşlem sırasında göğüs cerrahisi ile de konsülte edildi



TORAKS BT

OLGU 3

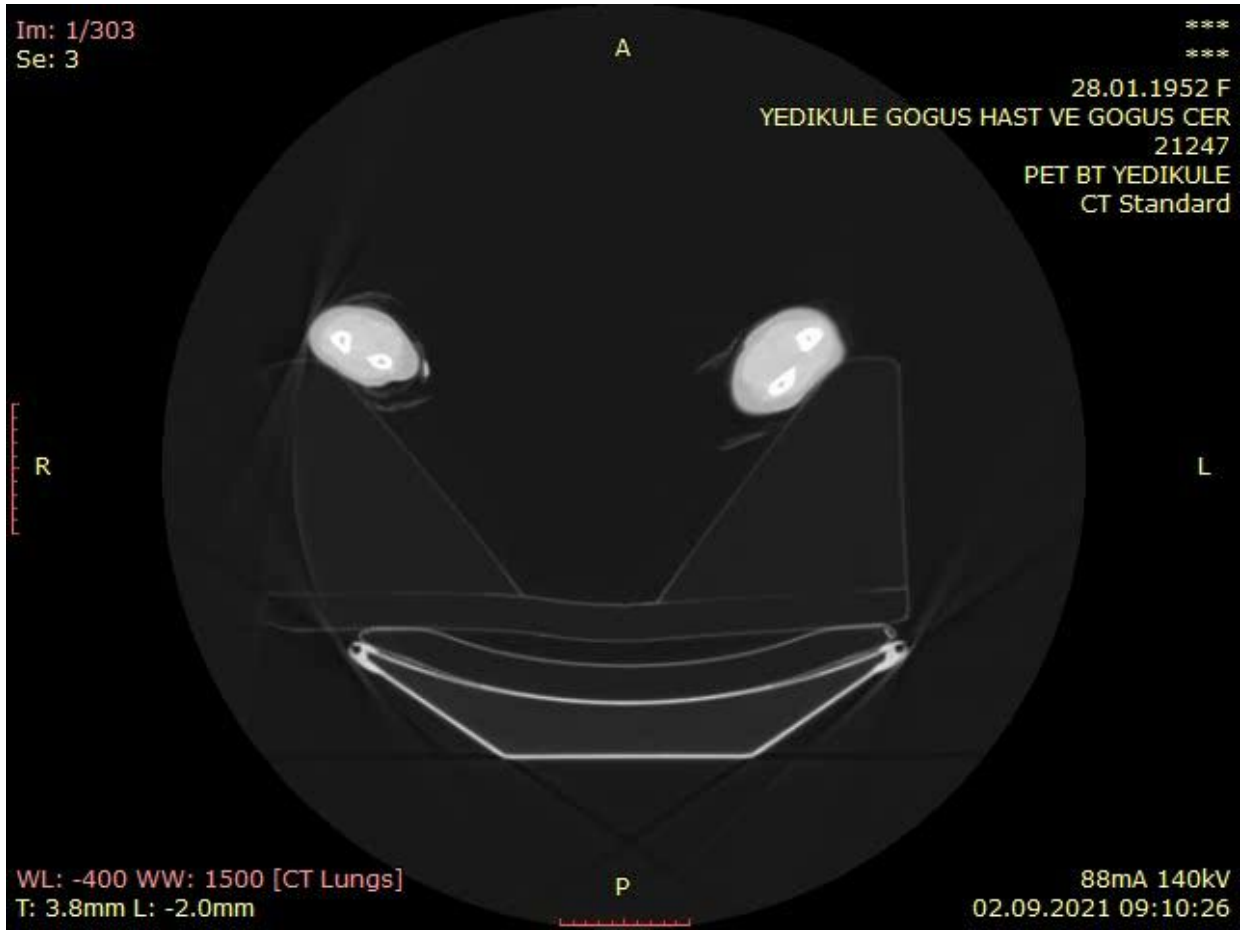
- Yoğun bakımda hastanın ventile edilememesi nedeni ile girişimsel bronkolojiden konsültasyon
- Toraks BT’si değerlendirilen hasta dış YB’dan entübe olarak işleme alındı

OLGU 3

- Rijid bronkoskopi: Vokal kordlardan 2 cm sonra lümeni % 75 oblitere eden 1.5 cm devam eden kompleks stenoz izlendi
- Stenotik alan dilate edildi
- 3 ay sonra Ekim 2021 de tekrar nefes darlığı ile başvurdu ve yine trakeada stent proksimalinde stenotik alan izlendi.

OLGU 4

- Alışkanlık: Bir özellik yok
- Fizik Muayene:
  TA: 140/95 Sat: %98(oda) SDS: 16/dak
  Solunum sistemi: Stridor(+)
- Başvuru Laboratuar:
  Kayda değer patolojik değer yok

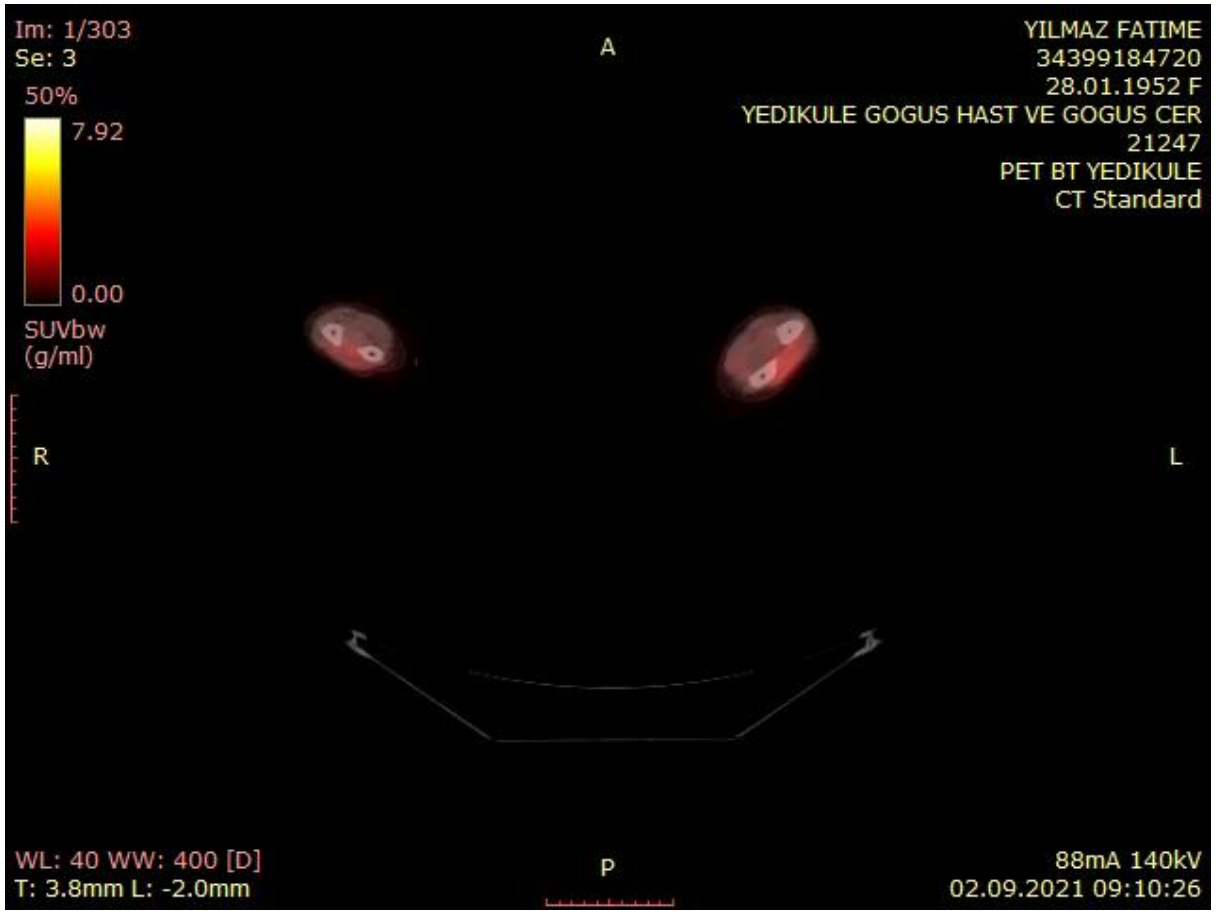


TORAKS BT

OLGU 4

- Hastaya ayaktan yapılan FOB'de trakeadan başlayarak her iki bronşiyal sistemde çok sayıda sert nodüler lezyonlar izlenmiş ve lezyonların sert yapısı nedeni ile örneklenememiş

- İşlem esnasında girişimsel pulmonoloji ekibimizden konsültasyon istenmiş ve rijid bronkoskopi planlanmış



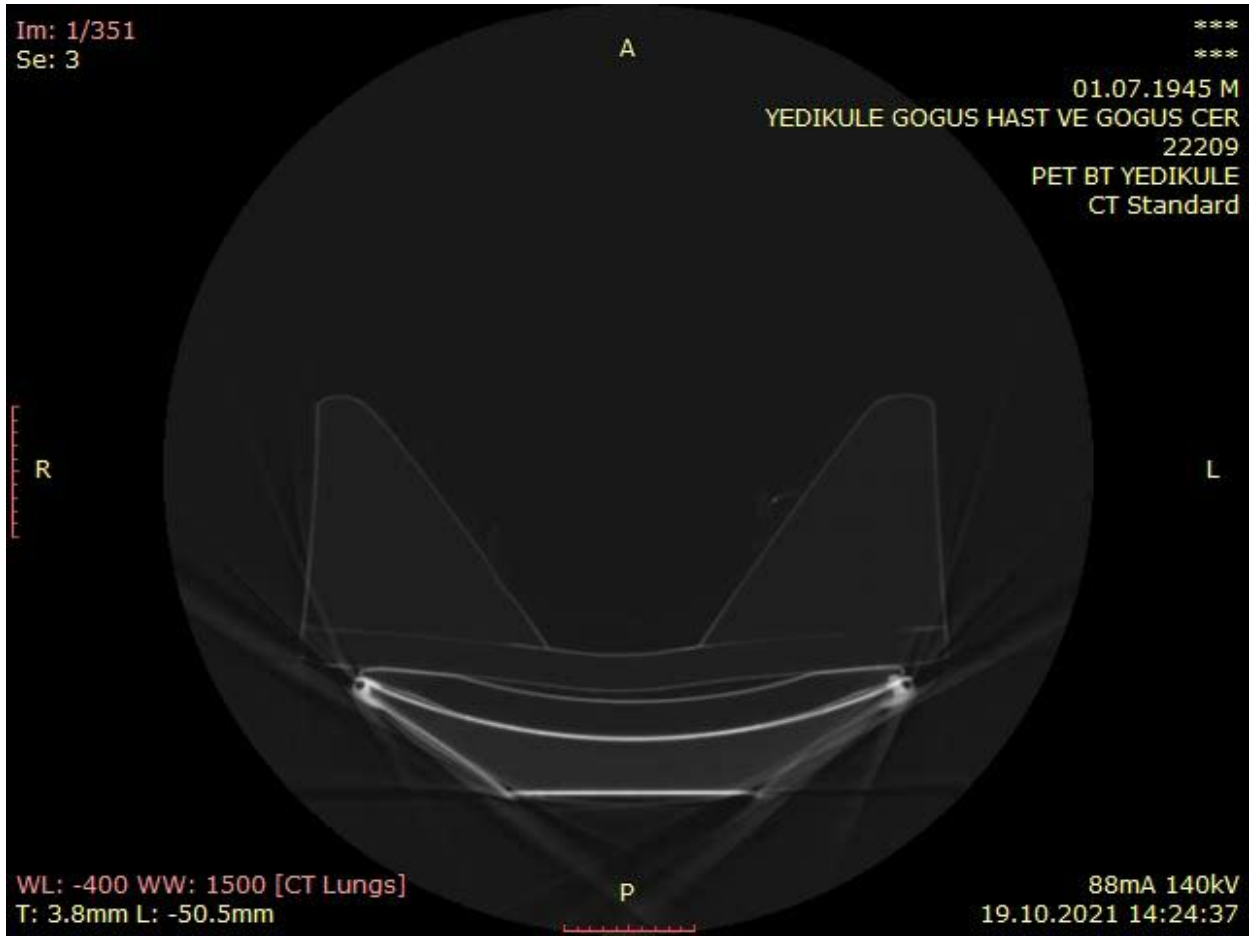
TÜM VÜCUT PET BT

OLGU 4

- Hastanın kontrollerde sağdaki PET(+) alanının da rezolüsyona uğradığı görüldü

OLGU 5

- Hasta poliklinikte değerlendirildikten sonra ayaktan yapılan fleksibl bronkoskopide sol ana bronş distalini tam olarak oblitere eden üzeri nekroze endobronşiyal lezyon görülmüş, işlem esnasında girişimsel pulmonoloji ekimizle konsülte edilerek rijid bronkoskopi planlanlanmış

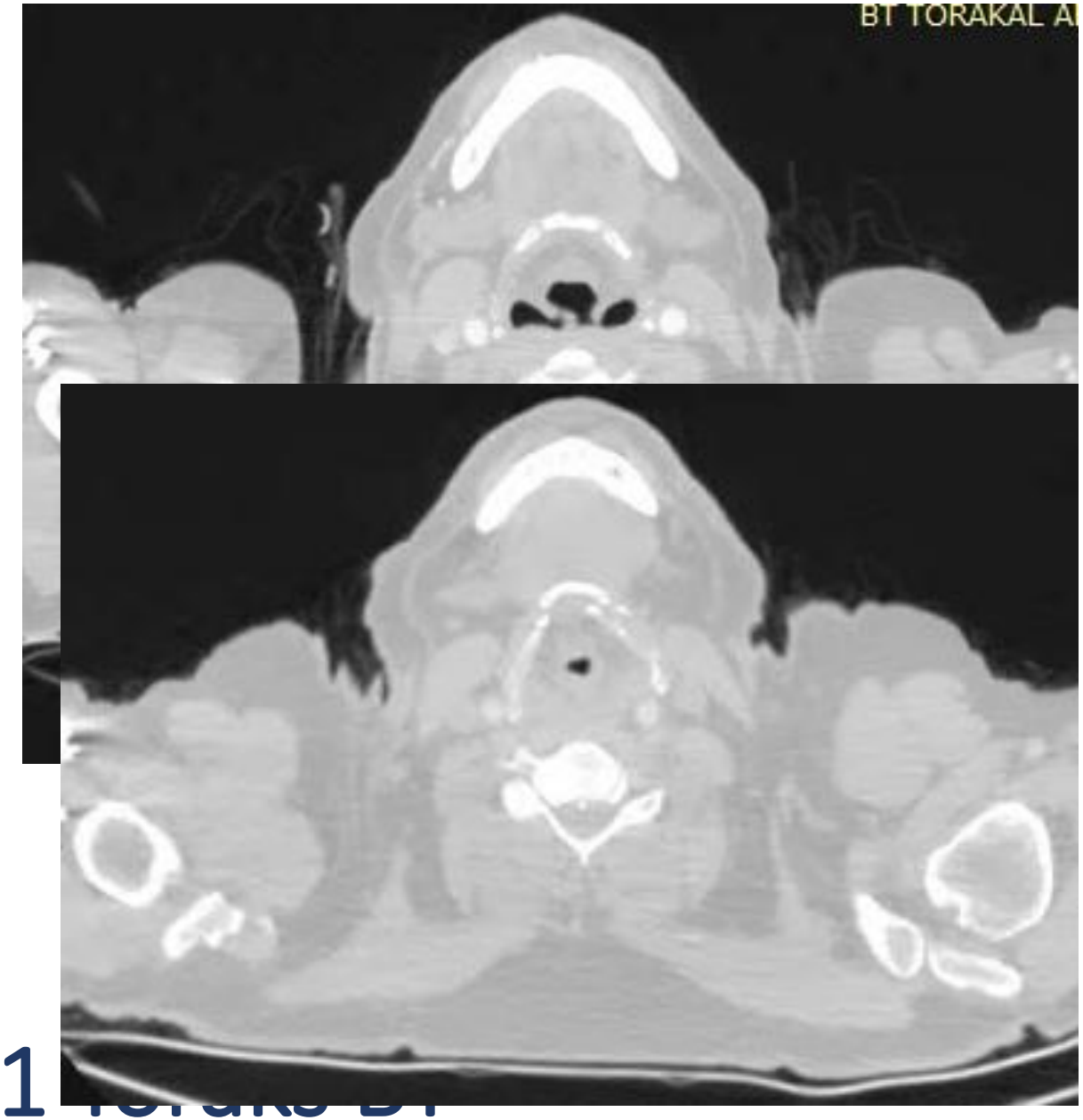


TORAKS BT

OLGU 6

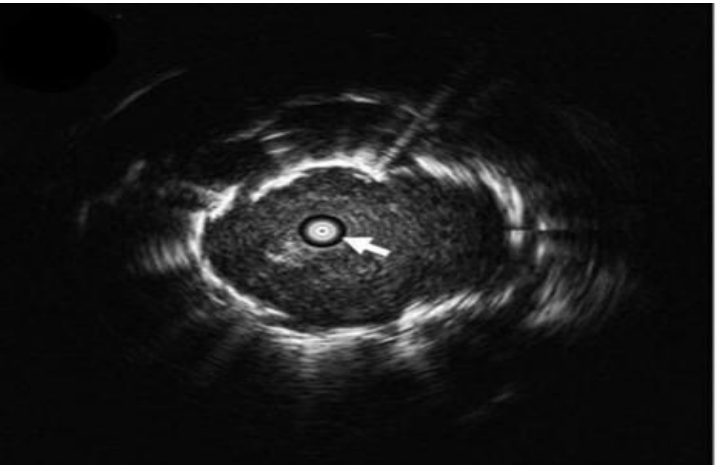
- Özgeçmiş: Bir özellik yok
- Alışkanlık: Sigara: 15p/yıl, aktif içici
- Fizik Muayene:

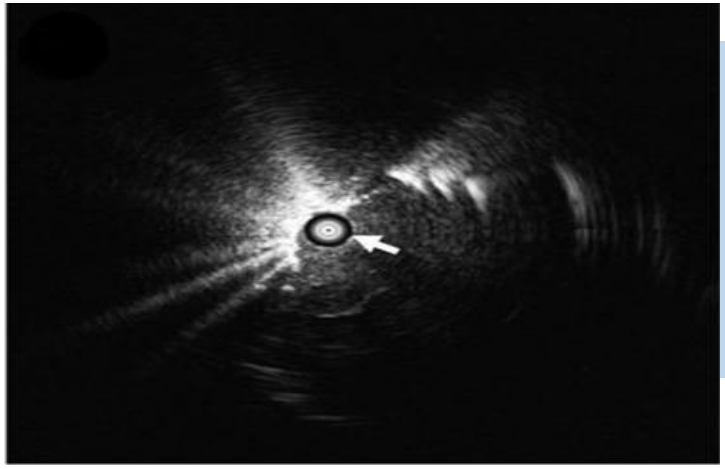
OLGU 3



Tanı başarısını etkileyen faktörler?

‘Bronkus işareti’





Tanı başarısını etkileyen faktörler?

‘Probun lezyon içindeki yeri!!’

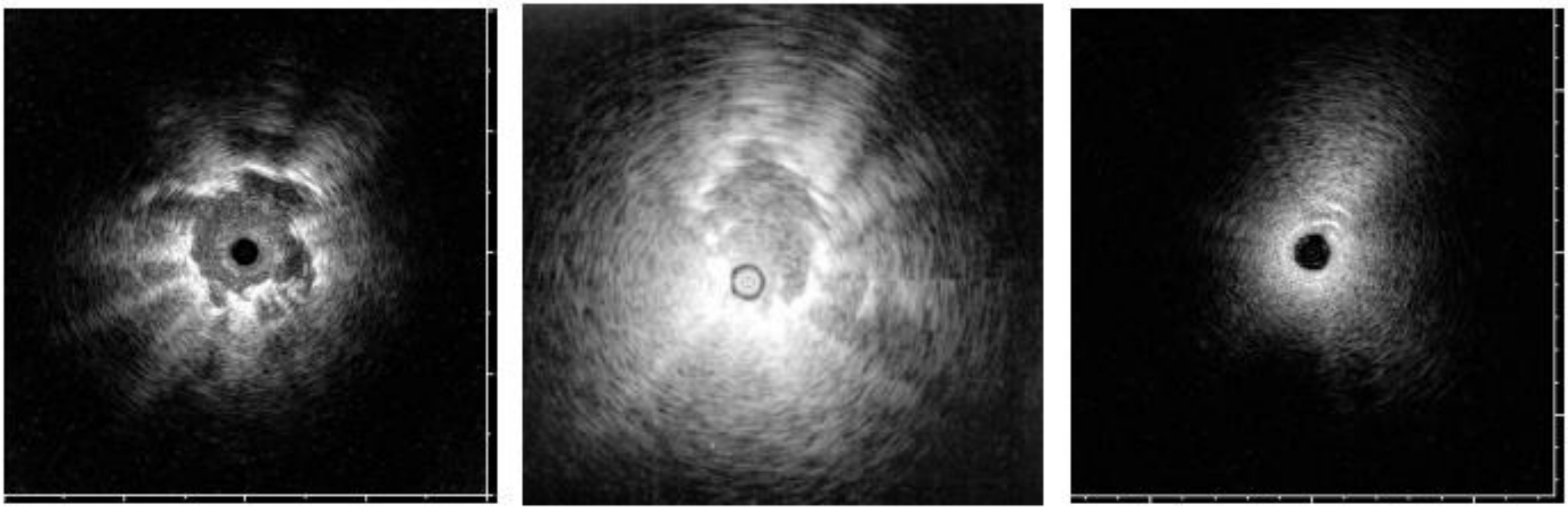


FIGURE 1. When evaluating the position of the probe against the PPLs on EBUS images, the position of the probe was divided into three patterns, as previously reported. *Left*: within the PPL; the probe was located in the bronchus inside the PPL. *Middle*: adjacent to; the probe was located in the bronchus adjacent to the PPL. *Right*: outside; the probe was located in the bronchus outside the PPL.

English dentist Charles Stent

Fig. 1. Charles Stent, 1807-1885.

STENTS

IMPRESSION COMPOSITION,

FOR TAKING

Perfect Impressions of the Mouth.

CAN BE USED FOR MANY DENTAL PURPOSES.

THE MOST RELIABLE ARTICLE IN THE MARKET.

Used by all the Leading Dentists.

TO BE HAD AT ALL DEPÔTS IN THE WORLD.

4s. per lb., or 6 lbs. for 21s.

STENTS

RENOVATING COMPOSITION.

Expressly made to be mixed with Stentoform Powder, making it as Good as New. 4s. per lb.

Each box of Original Stents Composition bears the signature across the label.

C. P. & A. Stent.

SOLE AGENTS:

CLAUDIUS ASH & SONS,

LIMITED

5, 6, 7, 8 and 9, URSAM STREET, GOLDEN SQUARE,

LONDON, W.

Trakeobronşiyal stentler

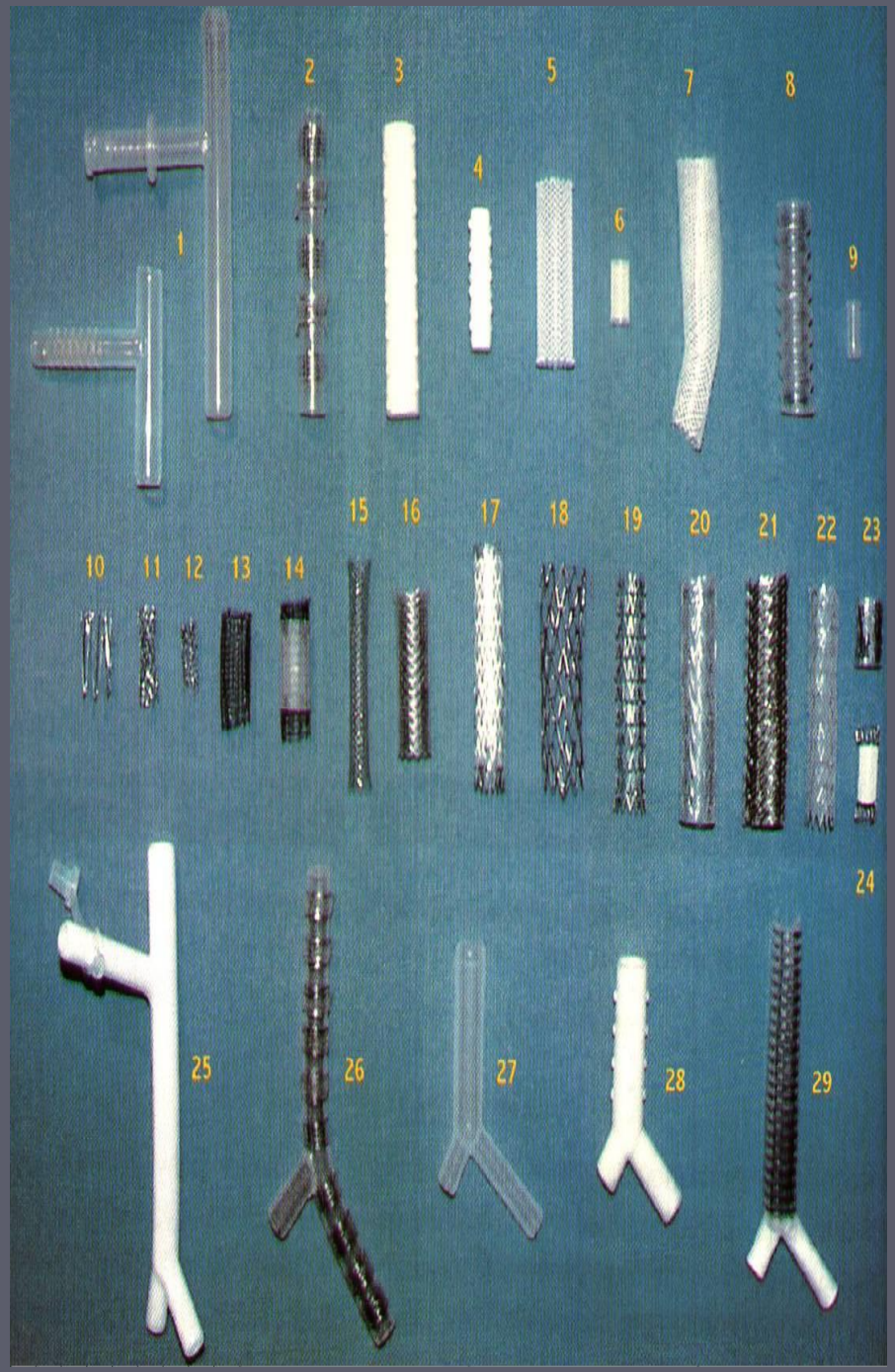
- **İlk tanımlayan dişhekimi C.R. Stent**
- **1907: Killian metalik stent**
- **1915: Brüning kauçuk stent**
- **1933: Canfield gümüş stent**
- **1965: Montgomery T Tüp**
- **1965: Anderson Silikon stent**
- **1978: Totj Nd:YAG Laser**
- **1990: Dumon-Silikon Stent**
- **1992: Nitinol-Stent**
- **1992: Dinamik Stent**

İDEAL STENT

- Kolay yerleştirilmeli
- Hava yolu dinamiklerine uyum göstermeli
- Trakea bronşa yüksek basınç uygulamamalı
- Nötral olmalı
- Migre olmamalı
- Mukostazise yol açmamalı
- Kolayca çıkarılmalı
- Ucuz olmalı

Endobronşiyal stentler

- Metal / kendiliğinden-açılabilen
  - Wallstent, Ultraflex
- Silikon
  - Dumon, Hood, Noppen, Montgomery, Polyflex
- Hibrid
  - Rüsch Y- dinamik
  - Silmet, Alveolus



STENT YERLEŞTİRİLMESİ

Güvenli ventilasyon

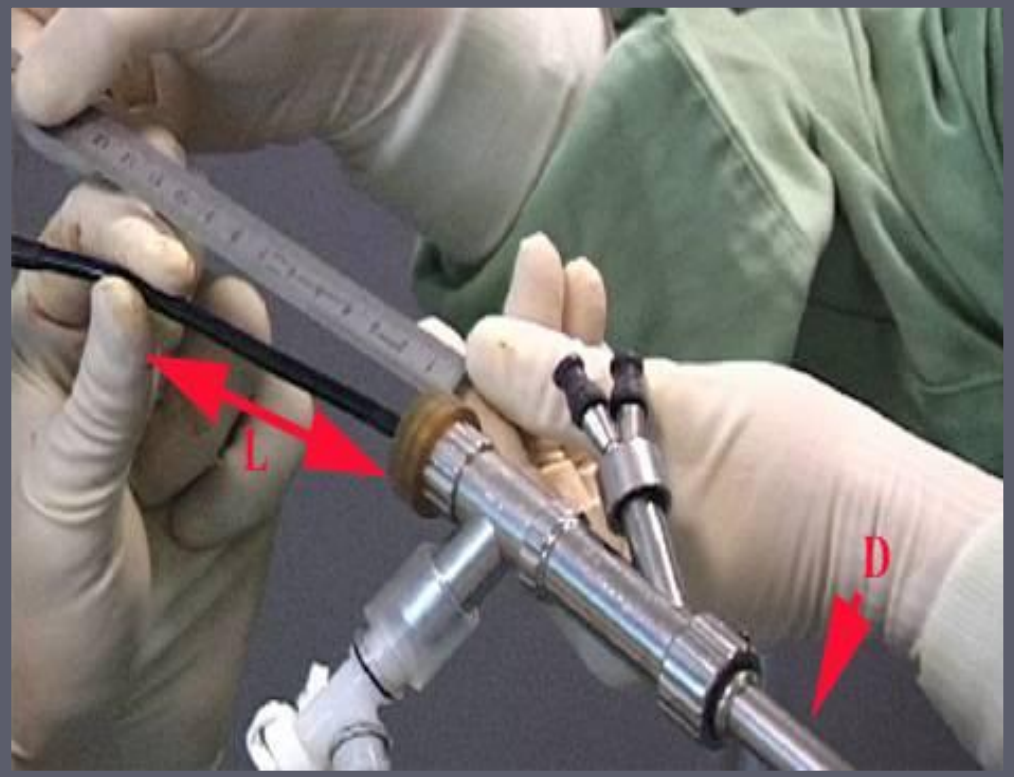
Dilatasyon

Güvenli yerleştirme

Güvenli komplikasyon yönetimi

Metalik Stentler

- **Hekime bağlı komplikasyonlar**
- Endikasyon doğru mu?
- Uygun stent mi?
- Migrasyon
  - Çap uygun mu?
  - Stent tipi uygun mu?
- Mukostaz
  - SF nebul (3kez/gün) önerilmemiş
- **Hasta/Hastalıkla İlişkili Komplikasyonlar**
- Migrasyon
  - Subglottik stenoz,malazi
- Obstrüksiyon
  - Kistik fibrozis,yoğun sekresyon
- Granülasyon
  - Diyabet
- Bakteriyel kolonizasyon
  - İmmün süprese hasta, transplantlı hasta,kistik fibrozis,diyabet



Uzunluk ve Çap ölçümü

- Stenozun her bir ucundan trakeada *1 cm*, bronşlarda *0.5* cm daha uzun stent seçilmeli
- BT ve endoskopi bulgularına göre

→ Timing of airway stenting ?

Havayolu stentlemenin zamanlaması?

SPOC = R

Silicone Prosthesis to Prevent Airway Obstruction Recurrence in Lung Cancers

European Respiratory Society
Annual Congress 2013

Abstract Number: 5117
Publication Number: P3752

…stract Group: 1.4. Interventional Pulmonology
…yword 1: Lung cancer / Oncology **Keyword 2:** Bronchoscopy **Keyword 3:** Airway management

…le: Is a stent required after the initial resection of an obstructive lung cancer? The lessons of the SPOC trial, the first randomized study in interventional bronchoscopy

Prof. Dr Jean-Michel 33080 Vergnon vergnon@univ-st-etienne.fr MD [1,2], Dr. Yoann 33081 Thibout yoann.thibout@chu-st-etienne.fr MD [1], Dr. Herve 33082 Dutau Herve.DUTAU@ap-hm.fr MD [3], Dr. Michel 33083 Febvre michel.febvre@sat.aphp.fr MD [4], Dr. Laurent 33084 Cellerin laurent.cellerin@chu-nantes.fr MD [5], Dr. Christophe 33085 Hermant hermant.c@chu-toulouse.fr MD [6] and Dr. Fabrice 33088 Di Palma fabrice.dipalma@hotmail.fr [1]. [1] Chest Diseases and Thoracic Oncology, University Hospital, Saint Etienne, France, 42055 ; [2] LINA EA 4624, University Jean Monnet, Saint Etienne, France, 42000 ; [3] Thoracic Endoscopy Unit, Chest Diseases Department, North Hospital, University Hospital, Marseille, France, 13000 ; [4] Chest Diseases, Saint Antoine Hospital, University Hospital, Paris, France, 75000 ; [5] Chest Diseases, Laennec Hospital, University Hospital, Nantes, France, 44093 and [6] Thoracic Endoscopy Unit, Chest Diseases Department, Larrey Hospital, University Hospital, Toulouse, France, 31000 .

75 patients randomized (39 stent ; 36 no stent)

primary endpoint : 1 year survival without recurrence >50%

Recurrence rate local obstruction strongly decreased in stent arm

Survical at 1 year : no difference.

Vergnon et al. ERS Congress 2013 Oral presentation.

MİGRASYON

- **Silikon** **%3-13**
- **Metalik stent** **%0-17**

- **Küçük çaplı stent**
- **Dış basının düşük olduğu hastalar**
  - **İntrensek malign stenoz**
  - **Malazi**

MUKOSTAZ

- **Silikon** **%6-50**
- **Metalik stent** **%18-39**

2. Jenerasyon stentlerle çözülebilecek komplikasyonlar

Başlıca sorunlar	İlaç salınımlı(aktiflenen)	Yeni üretim
Bakteriyel kolonizasyon	√	-
Mukostaz	√	√
Granülasyon /Re-stenoz	√	√
Migrasyon	-	√
Kompleks trakeobronşiyal anatomi	-	√
Daralan iç çap	-	√

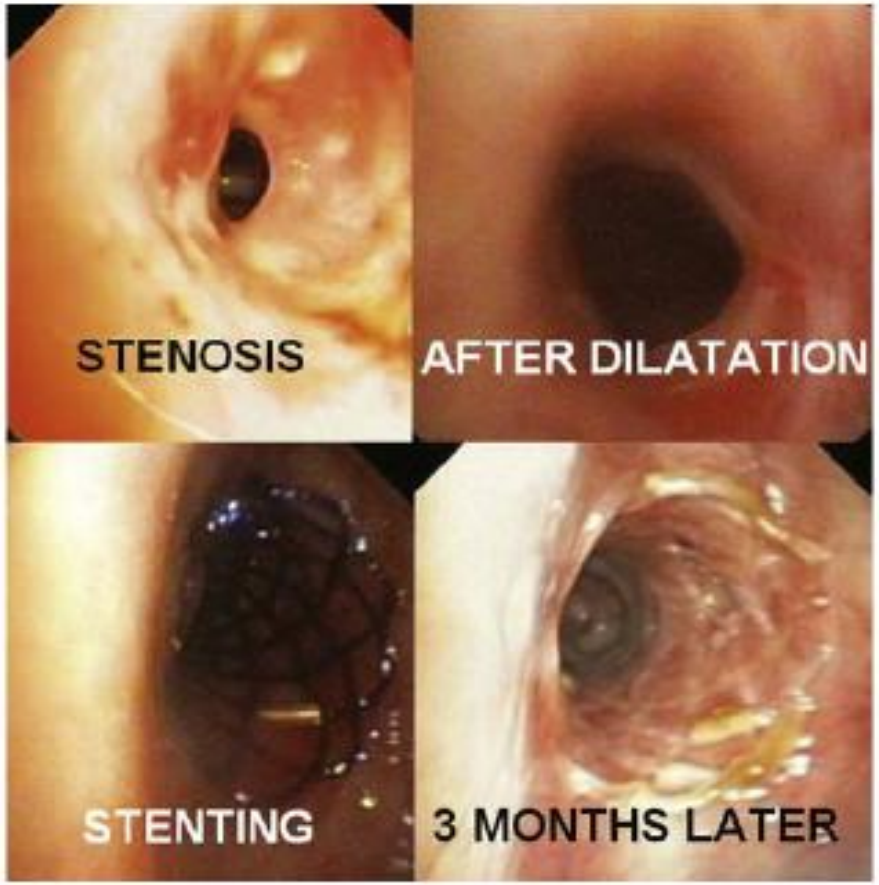
EUROPEAN ELSEVIER

European Journal of Cardio-thoracic Surgery 40 (2011) 619–624

www.elsevier.com/locate/ejcts

Novel biodegradable stents in the treatment of bronchial stenosis after lung transplantation☆,☆☆

Robert Lischke [a], Jiri Pozniak [a], David Vondrys [b,*], Martin J. Elliott [b]

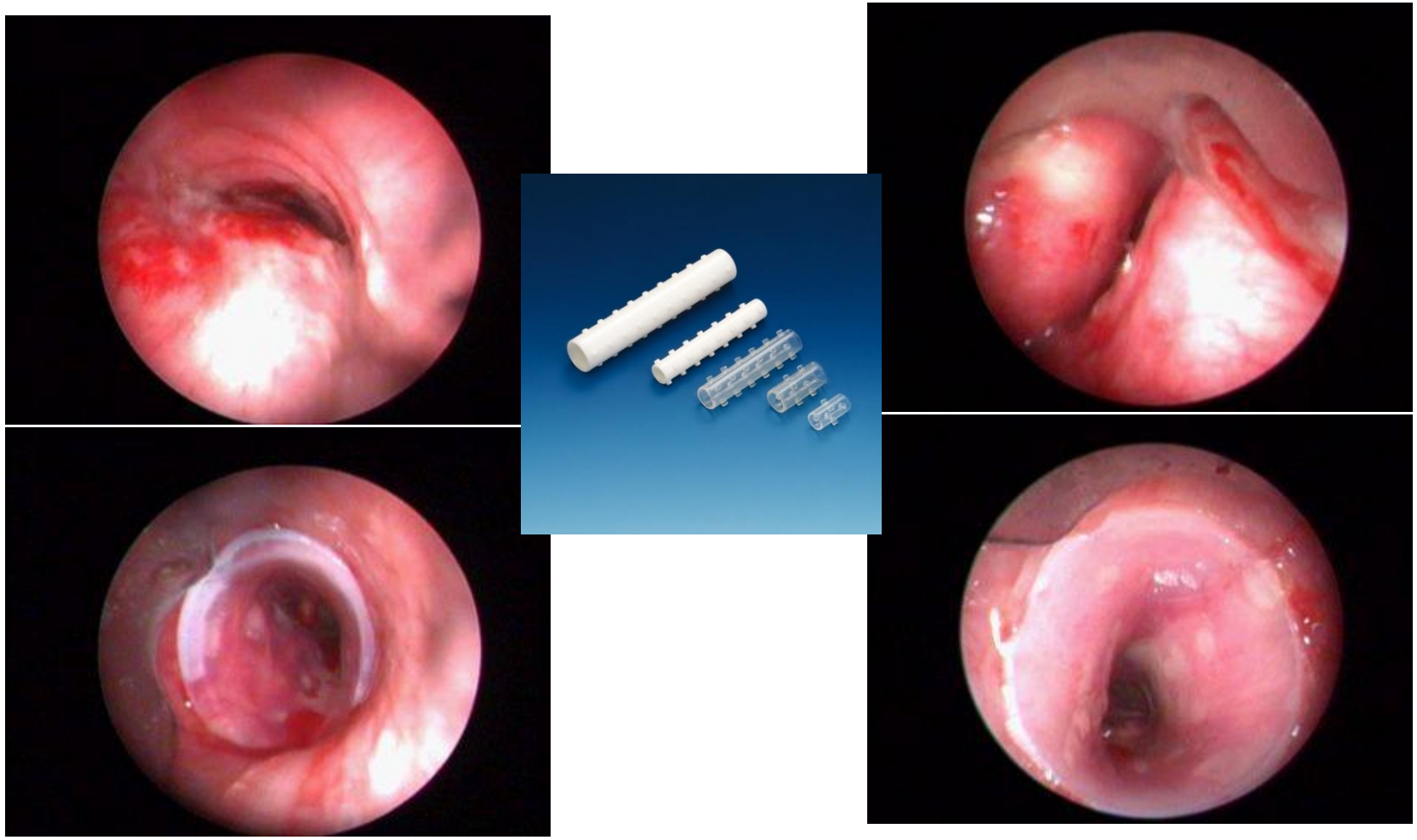


Generalitat de Catalunya
Departament de Salut

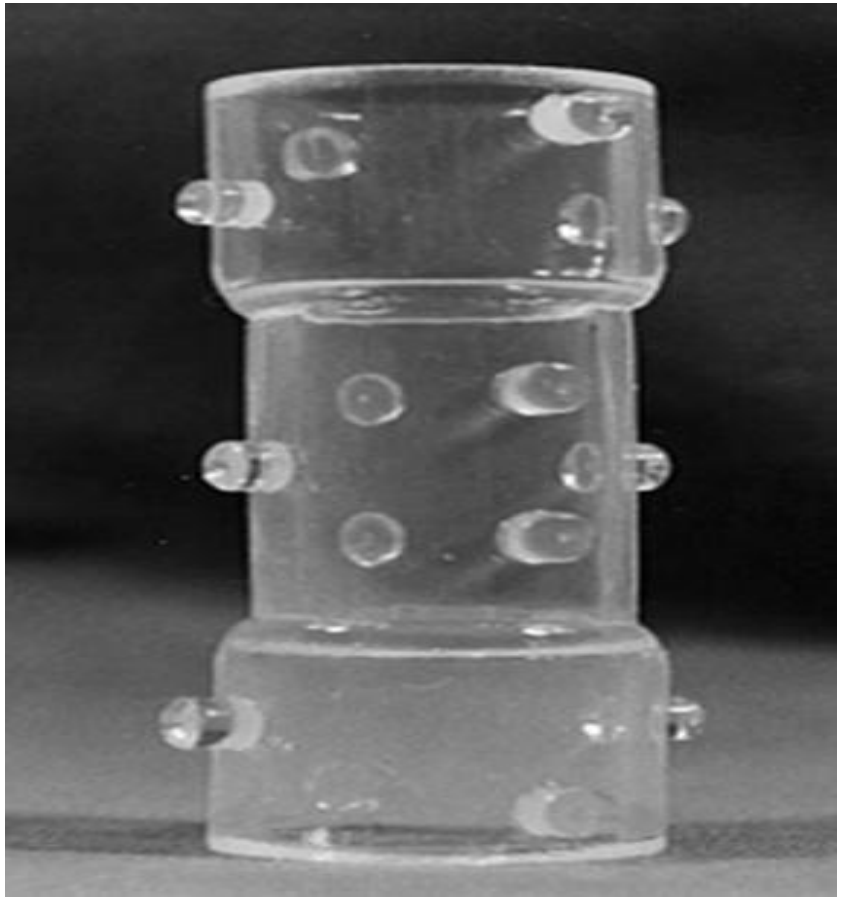
Institut Català de la Salut
Gerència Territorial
Metropolitana Sud

Bellvitge
Hospital Universitari

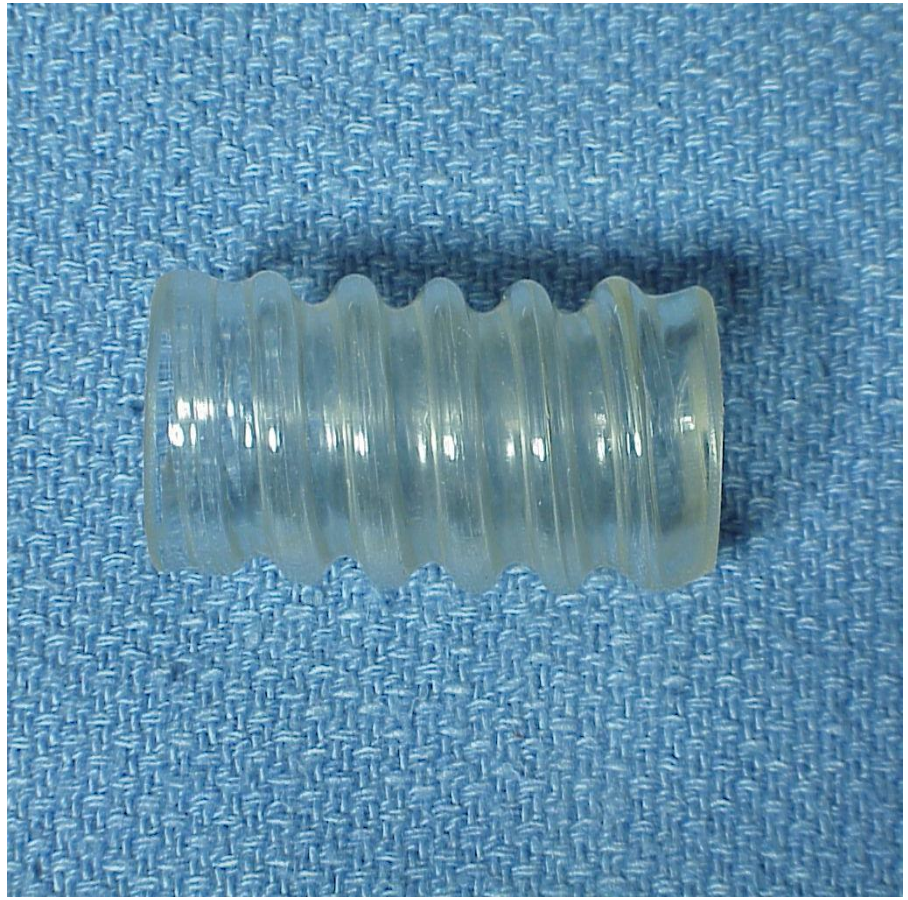
Düz silikon stent



Stenotik stent

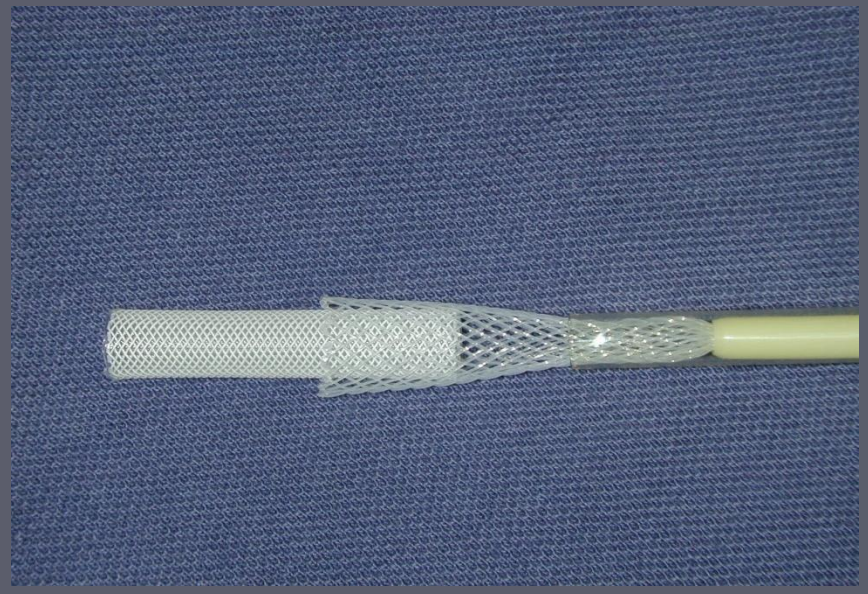


Noppen stent



Polyflex Stent

- Rijid bronkoskopi
- Aynı yükleme setiyle tekrar yüklenebilir



Hibrid Stentler

Genişleyen stent

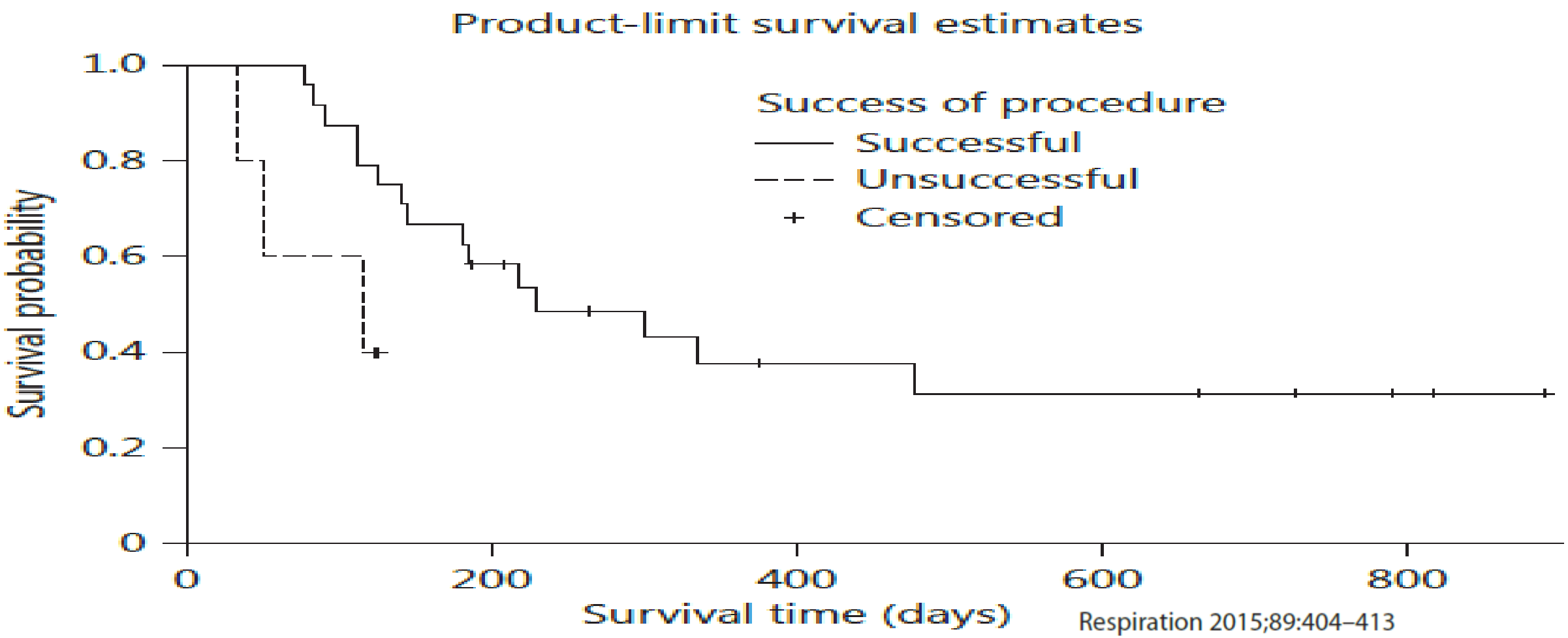
Alveolus

Genişlemeyen

Dinamik stent, Rusch

Therapeutic Bronchoscopy Improves Spirometry, Quality of Life, and Survival in Central Airway Obstruction

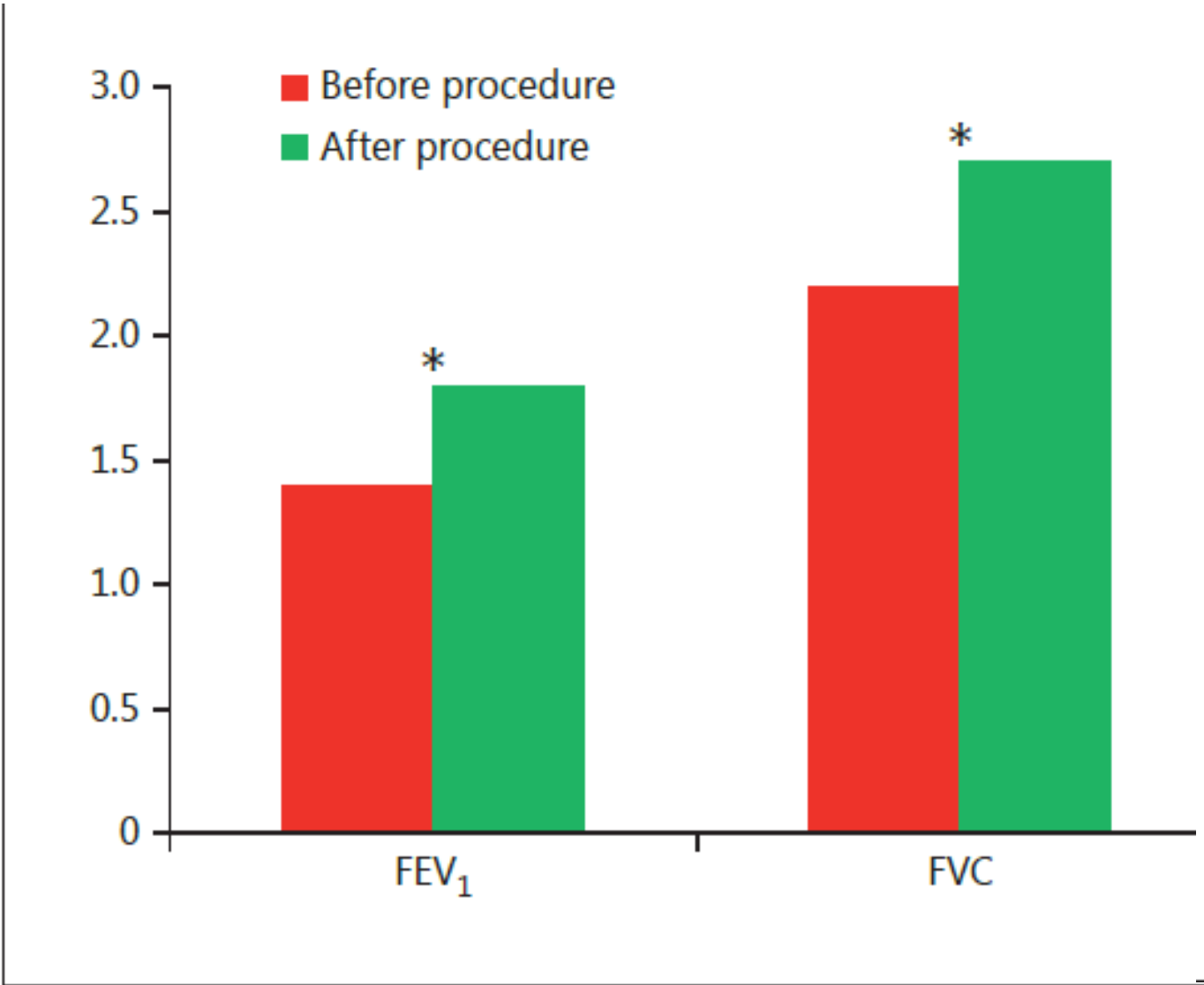
Kamran Mahmood[a] Momen M. Wahidi[a] Samantha Thomas[a]
Angela Christine Argento[b] Neil A. Ninan[c] Emily C. Smathers[a] Scott L. Shofer[a]

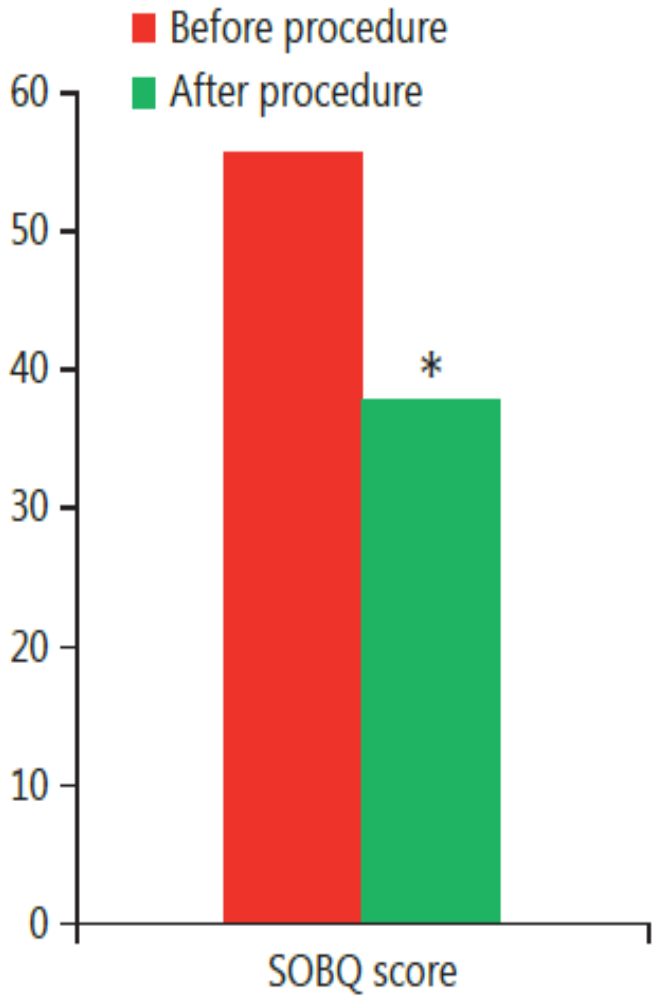


Respiration 2015;89:404–413
DOI: 10.1159/000381103

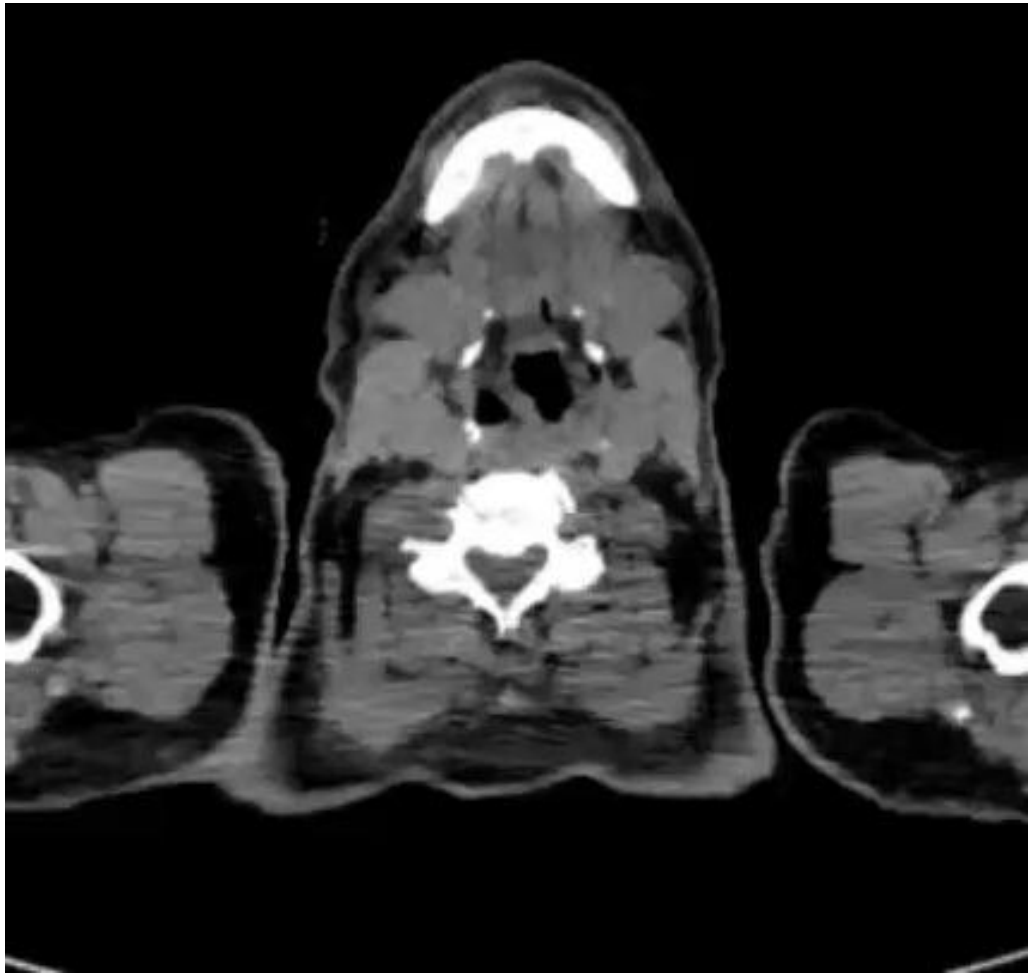
Therapeutic Bronchoscopy Improves Spirometry, Quality of Life, and Survival in Central Airway Obstruction

Kamran Mahmood[a] Momen M. Wahidi[a] Samantha Thomas[a]
Angela Christine Argento[b] Neil A. Ninan[c] Emily C. Smathers[a] Scott L. Shofer[a]





OLGU 7



Santral Havayolu Obstrüksiyonun Tanısı

- **Bronkoskopi**
  - **Havayolu mukozası ve stenoz natürü direkt gözlenebilir**
  - **Yoğun bakım hastalarında yapılabilir.**
  - **Ultrathin bronkoskopi**
    Stenoz distali

- **Radial EBUS**
  (Trakeal invazyon ve vasküler tutulum)

- **ASFİKSİ=ENTÜBASYON ve RİJİT BRONKOSKOPİ**

Semptomlar

Dispne

Nerede,ne kadar darlık var

Stridor 8 mm egzersiz

5 mm istirihat

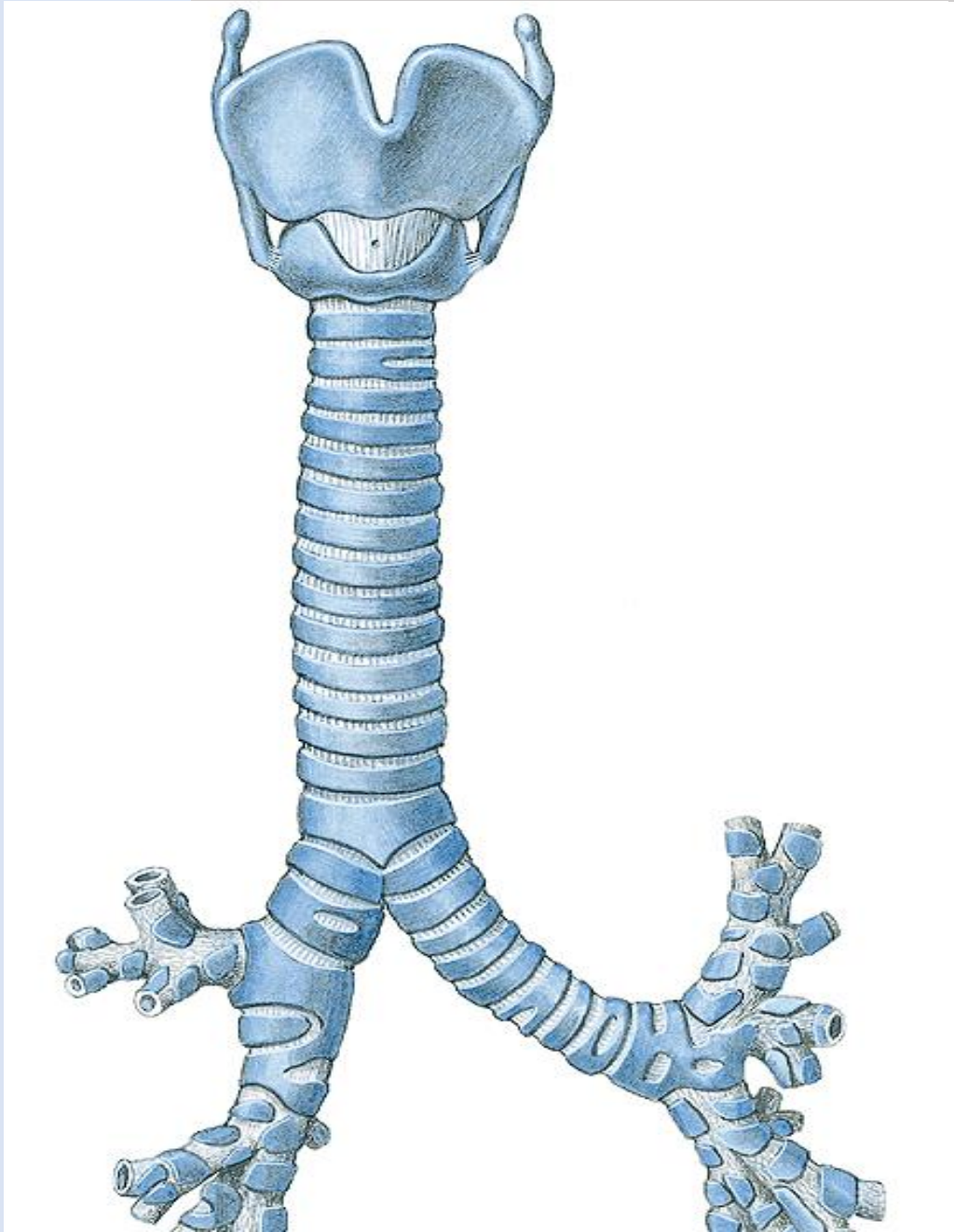
Bronkodilatöre yanıt vermeyen dispne

Ekstubasyon başarısızlığı

Öksürük

Hemoptizi

Pnömoni



KRYOTERAPİ

FİZİKSEL ETKİ

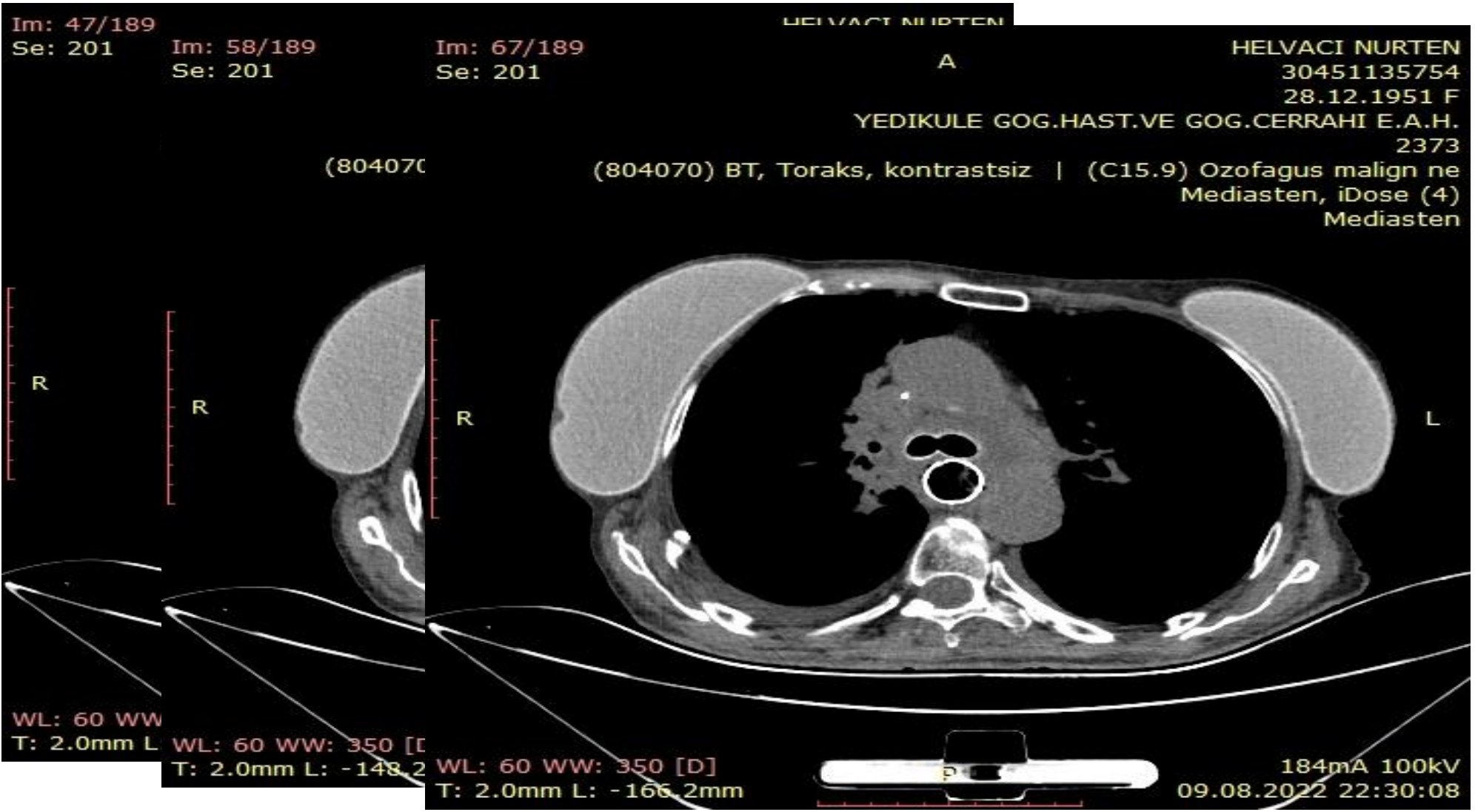
Hızlı donma ve yavaş erime döngüsü ile hücre içi buz kristalleri oluşumu hücre içi asiditenin artması

VASKÜLER ETKİ

Vazokonstrüksiyon (İskemi)

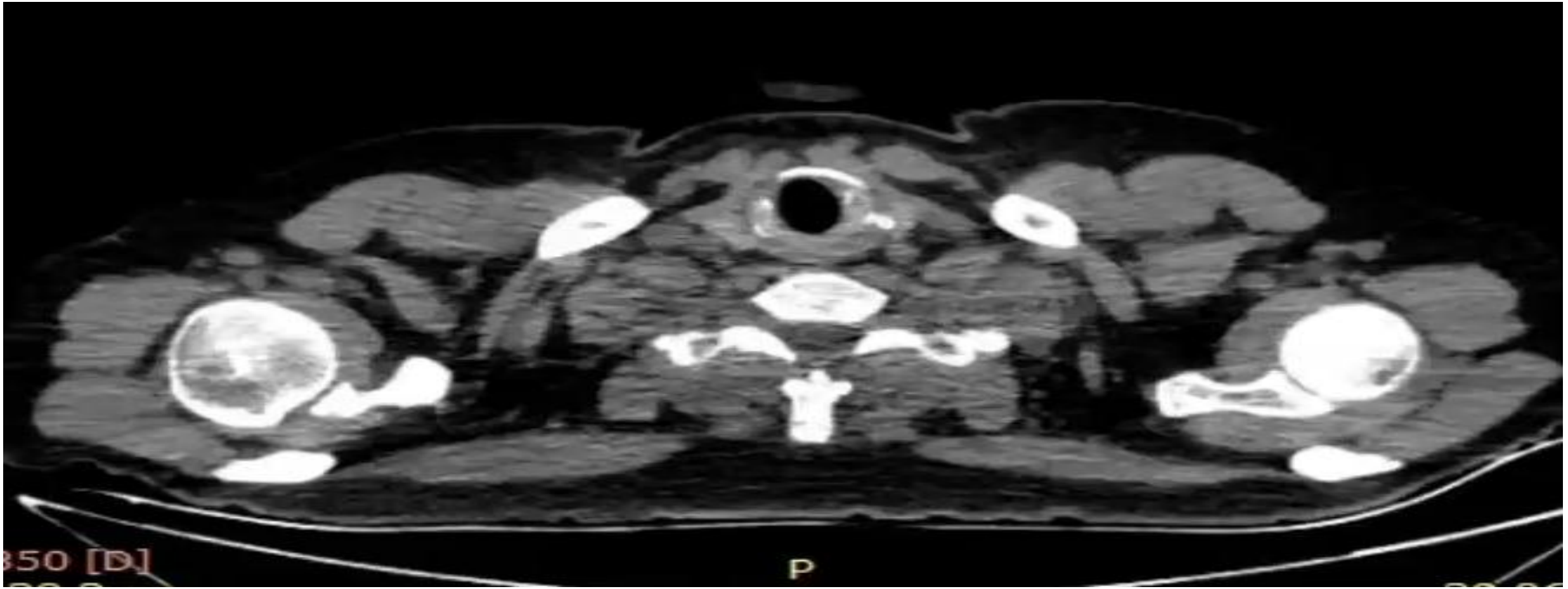
Trombosit agregasyonu (Tromboz)

Artmış kan vizkositesi

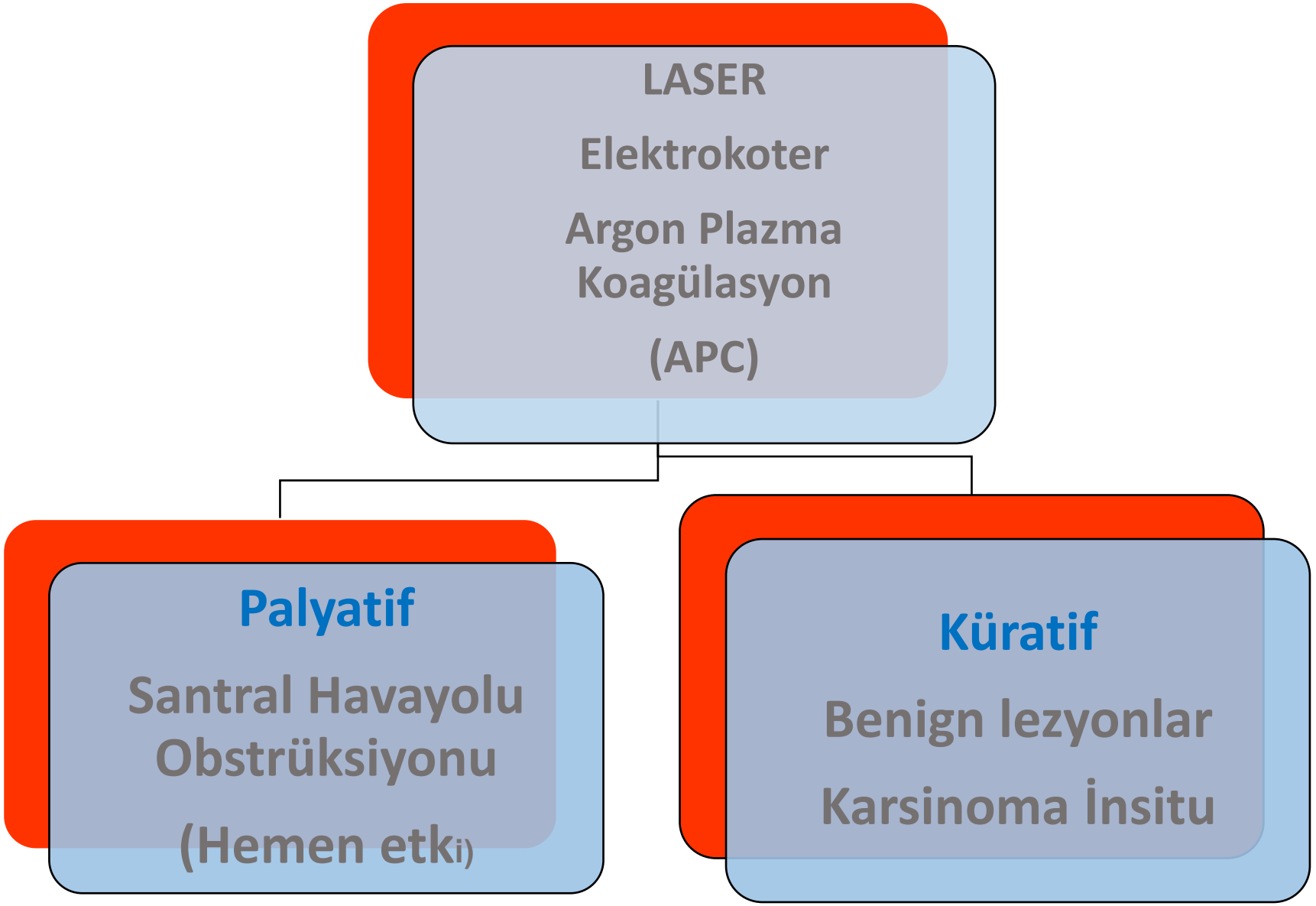

Im: 47/189
Se: 201
Im: 58/189
Se: 201
Im: 67/189
Se: 201
A
HELVACI NURTEN
30451135754
28.12.1951 F
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
2373
(804070) BT, Toraks, kontrastsiz | (C15.9) Ozofagus malign ne
Mediasten, iDose (4)
Mediasten
R
R
R
L
WL: 60 WW
T: 2.0mm L
WL: 60 WW: 350 [D
T: 2.0mm L: -148.2
WL: 60 WW: 350 [D]
T: 2.0mm L: -166.2mm
184mA 100kV
09.08.2022 22:30:08

OLGU 3

- Klinik rahatlama sağlanan hastada KT –RT tedavileri tamamlandı
- Ancak Haziran 2021 de ayında tekrar nefes darlığı nedeni ile başvurdu
- Çekilen Toraks BT’de stent proksimalinde trakeada stenotik alan izlendi

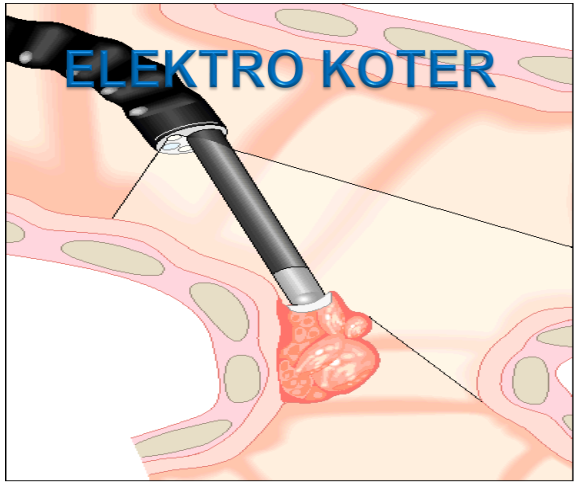


Endobronşiyal sıcak tedavi yöntemleri



ELEKTROKOTER

- Koter *kontakt (doku teması var)*



- Yüksek frekanslı elektrik akımı
  - Koagülasyon
  - Kesme
  - Vaporizasyon

Endobronşial lezyonların yok edilmesi

- Kanamalı lezyon koagulasyonu
- Erken evre tümör
- Hemoptizi

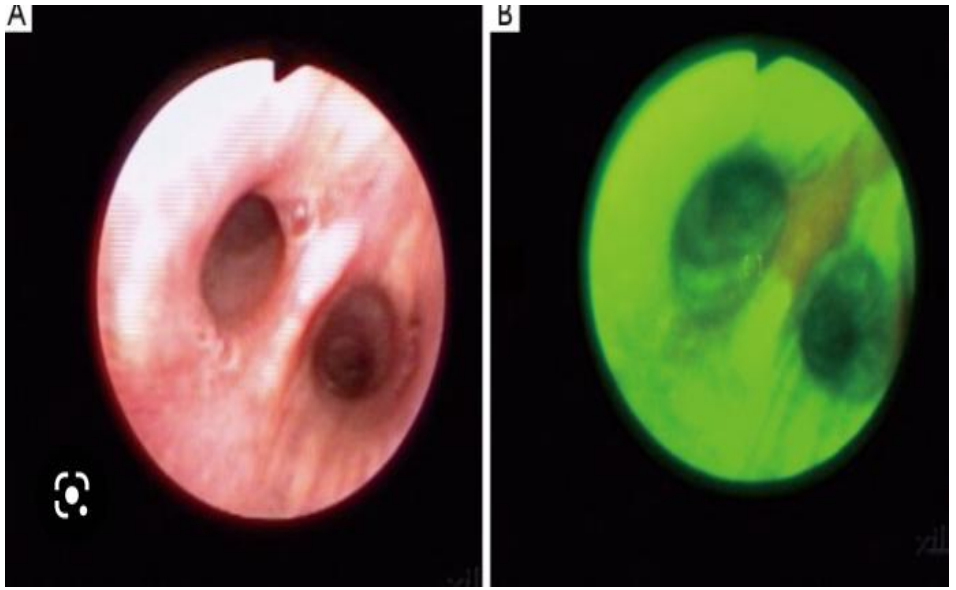
Karsinoma in situ

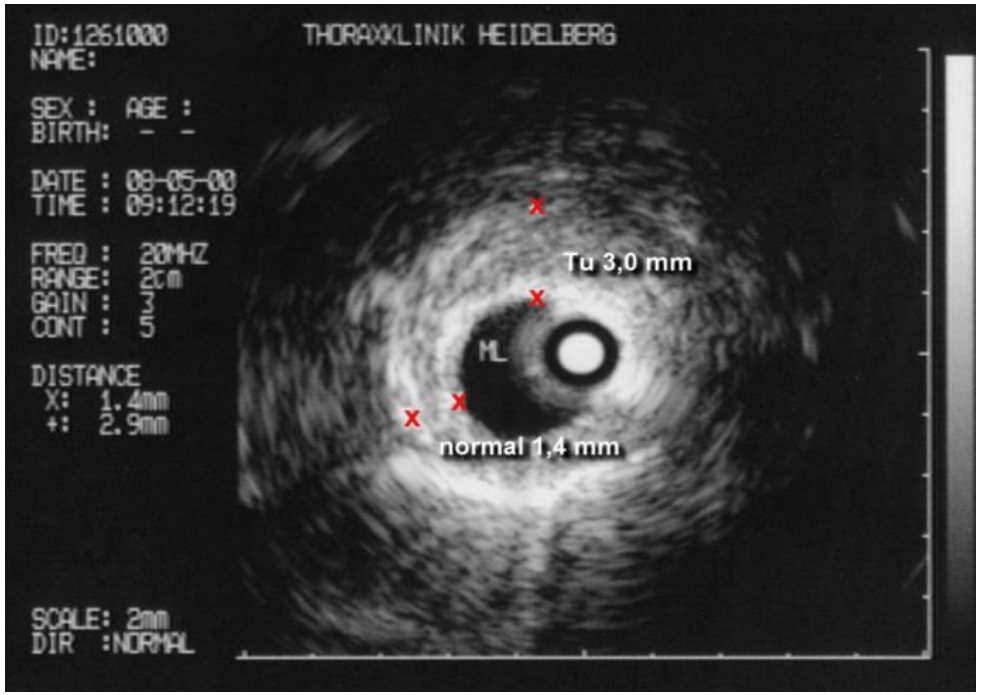
.Fotodinamik tedavi

.Brakiterapi

.Sıcak tedaviler

.Kriyoterapi





life

Review

Endoscopic Technologies for Peripheral Pulmonary Lesions: From Diagnosis to Therapy

Alberto Fantin [1,*], Massimiliano Manera [2], Vincenzo Patruno [1], Giulia Sartori [2], Nadia Castaldo [1] and Ernesto Crisafulli [2]

Table 2. Ablation technologies for PPLs and related mechanisms of action.

Method	Mechanism of Action
RFA	Electromagnetic-induced selective heat damage
MWA	Microwave-induced selective heat damage
PDT	Oxidative damage by a photosensitizing agent
Brachytherapy	Selective, high-dose radiation exposure
Cryoablation	Freezing-induced cytotoxicity and delayed cell apoptosis
BLITT	Heat-induced damage and charring
Thermal vapor ablation	Vapor-induced regional heat damage
Intralesional therapeutic drugs	Direct injection of an antineoplastic drug

RFA, radiofrequency ablation; MWA, microwave ablation; PDT, photodynamic therapy; BLITT, bronchoscopic laser interstitial thermal therapy; AEs, adverse events.

AMAÇ

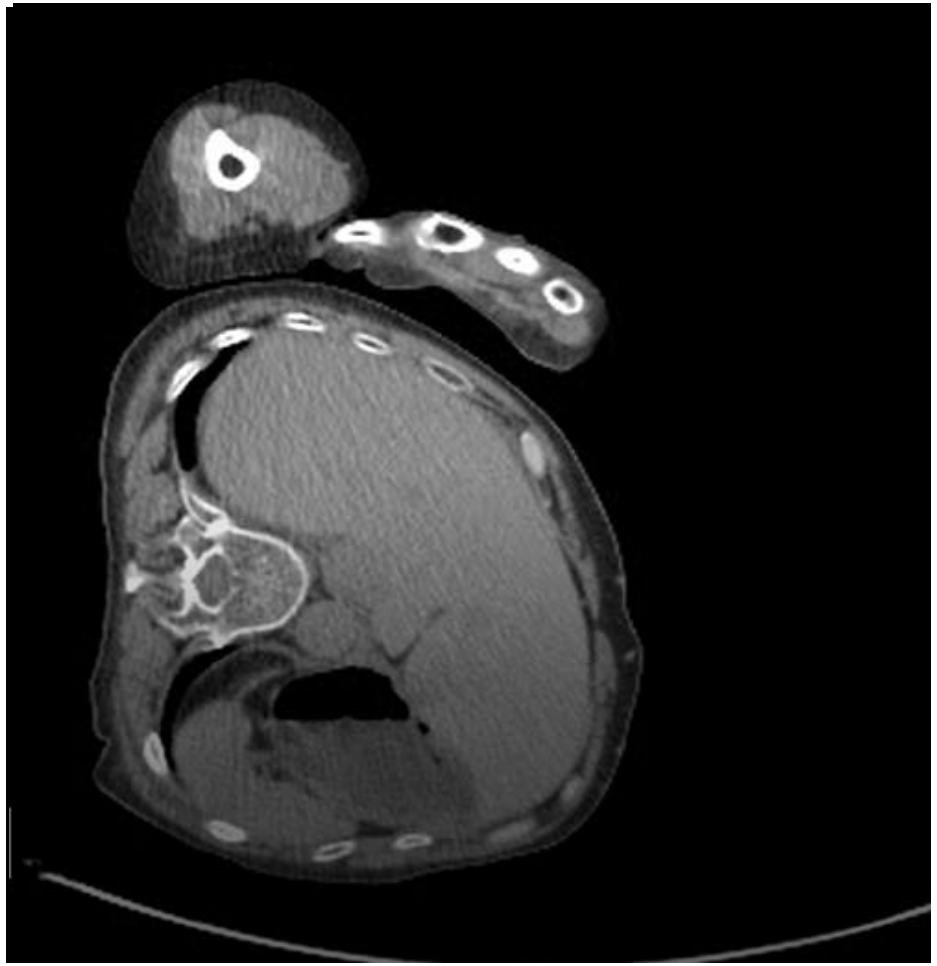
- **SANTRAL HAVA YOLU OBSTRÜKSİYONLARINDA**
- **Yeterli oksijenizasyon**
- **Yeterli ventilasyon**

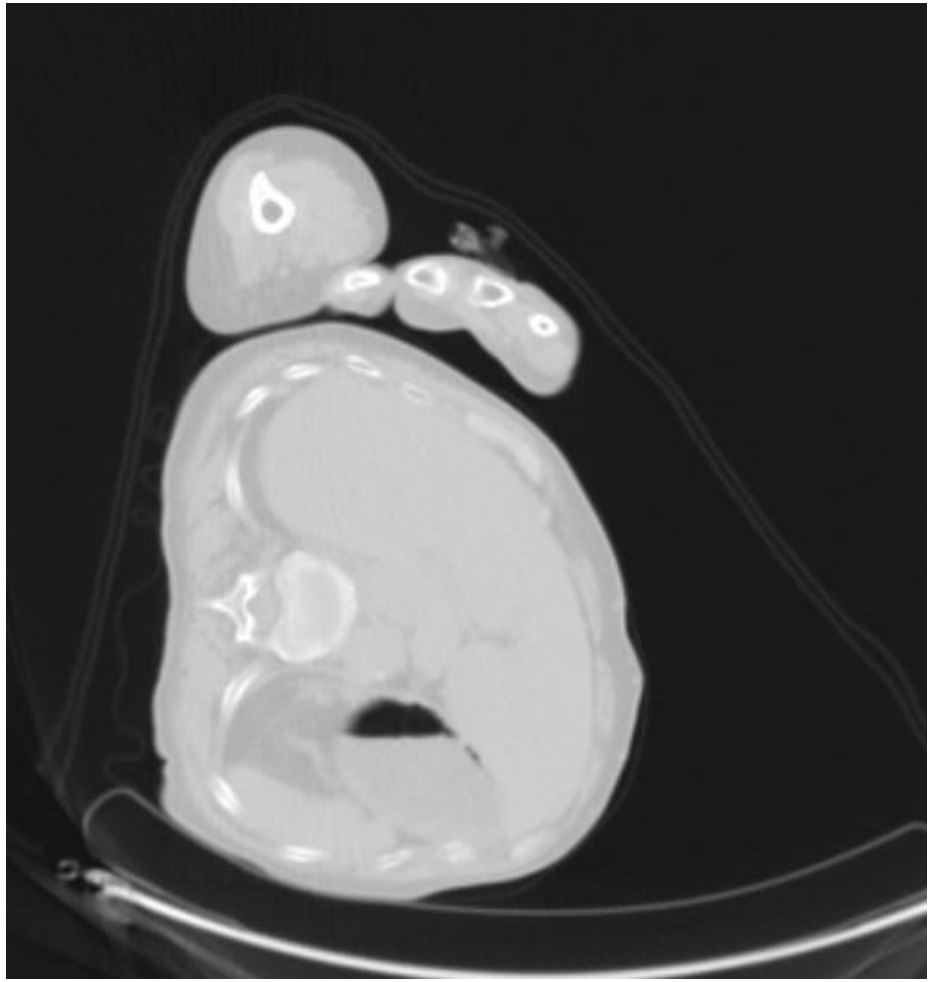
OLGU 3

- 57 yaşında, kadın
- Şikayet: Nefes darlığı, hırıltı, 3 ayda 20 kg kaybetme ve ses kısıklığı
- Hikayesi: 3 aydır bu semptomlarla dış merkezlerde tetkik edilen hasta, merkezimiz aciline hipoksik solunum yetmezliği ile başvurusunda çekilen BT sonrası interne edilmiş

OLGU 3

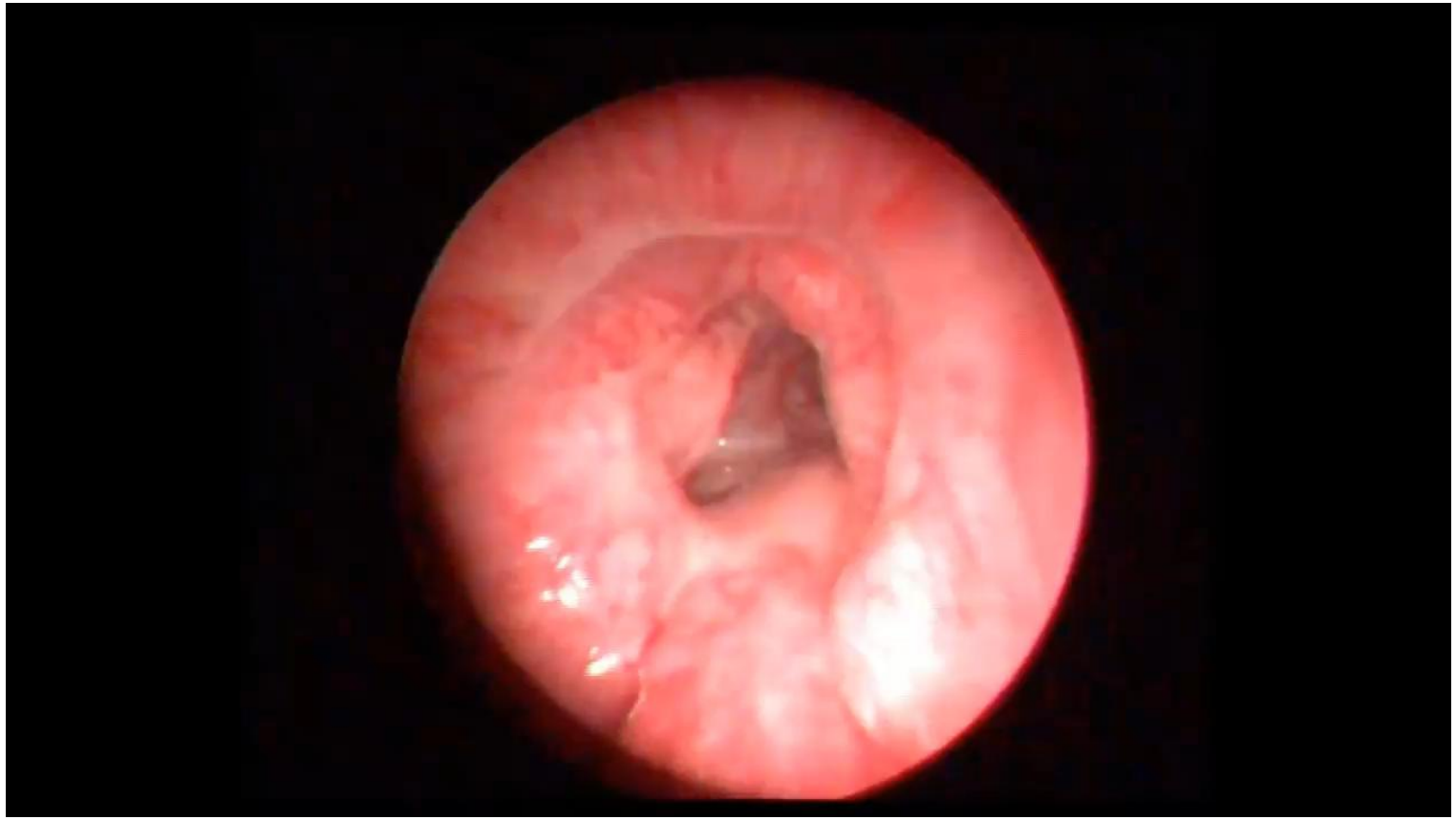
TORAKS BT





OLGU 3

RİJİD BRONKOSKOPİ



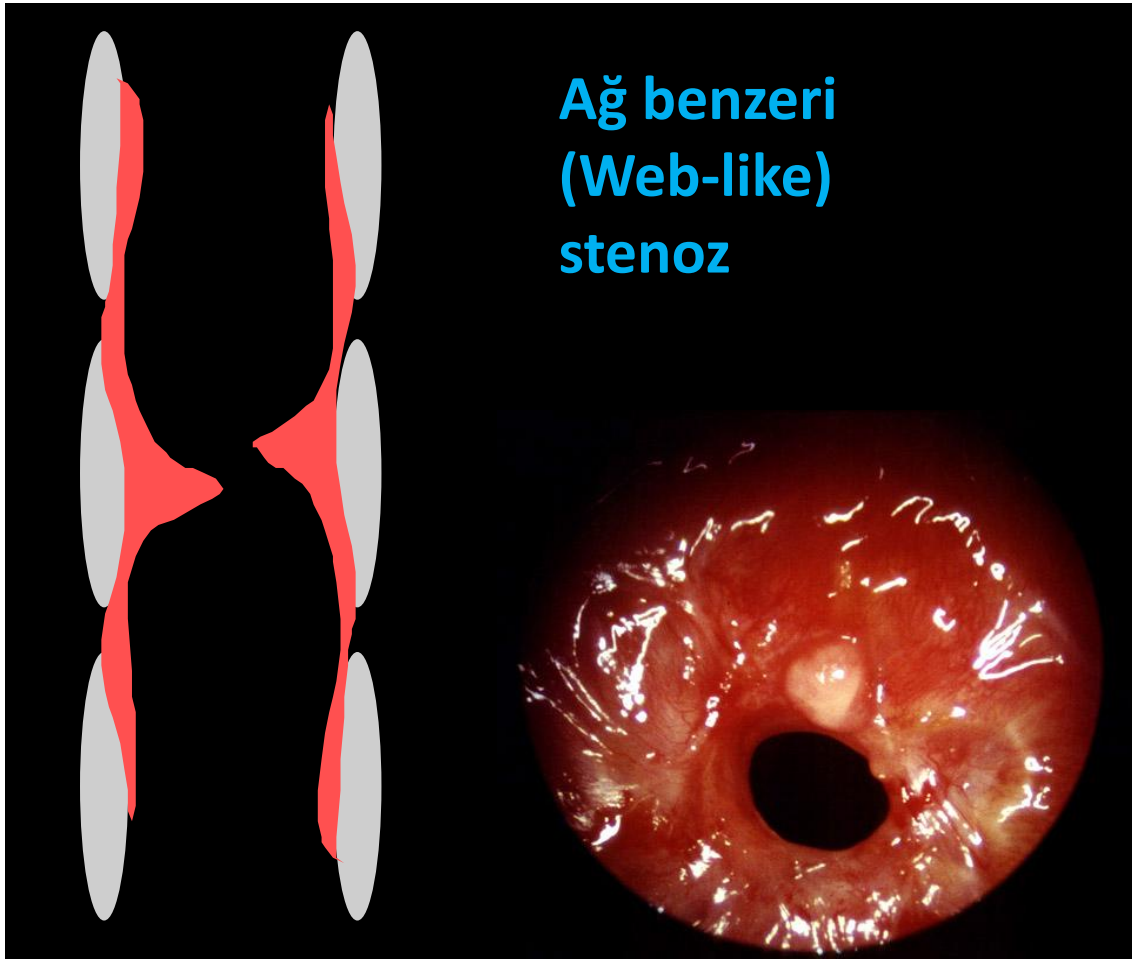
- **TAKİP:**
- Patoloji: Küçük hücreli akciğer karsinomu
- Hasta onkoloji bölümüne refere edildi

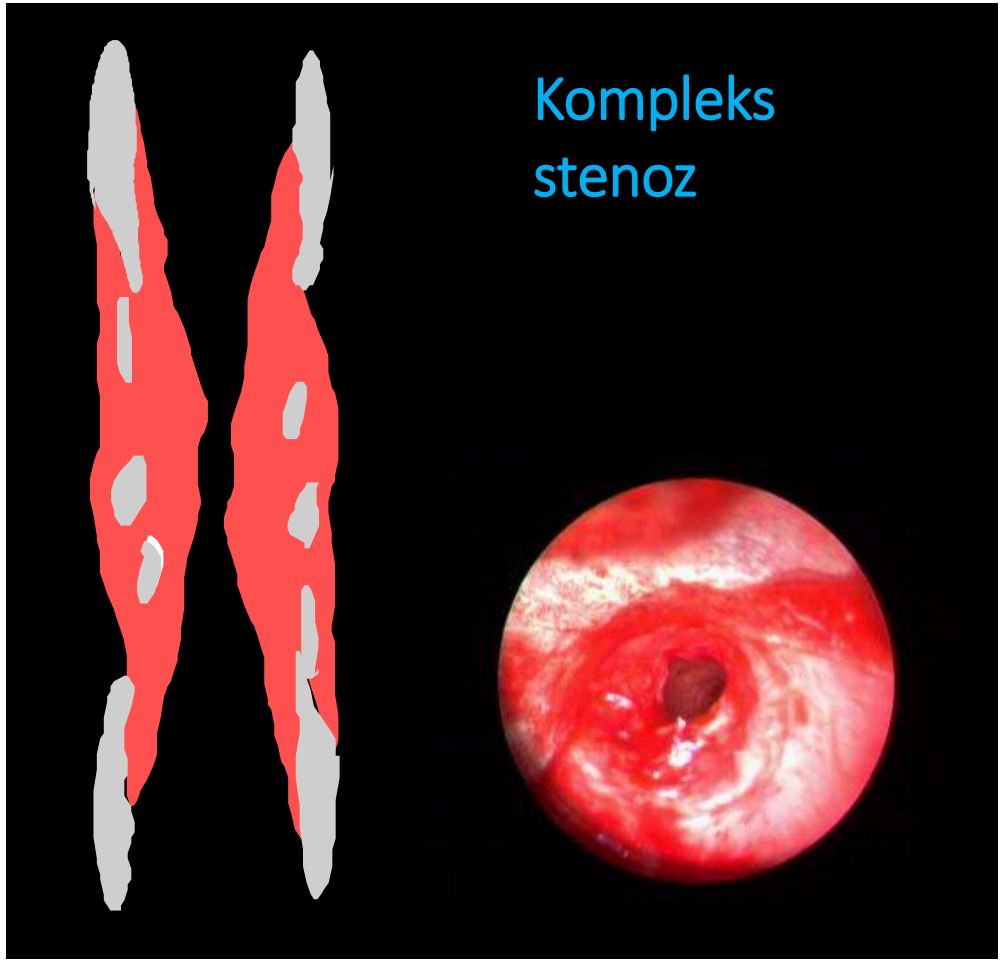
OLGU 2

- Özgeçmiş: DM, HT
- Alışkanlıkları: 40 paket/yıl sigara, 10 yıldır eks-smoker
- Fizik Muayene: TA:120/80 mmHg NDS:99/dk
  - SS: Dispneik, takipneik
    Sağda solunum sesleri azalmış
  - Diğer sistem muayeneleri doğal
- Laboratuvar:
  - Hemogram (Hb:12.9 g/Dl HCT:38.7 %
    PLT: 264 10e3/uL WBC: 9.9510 e3/uL)
  - Biyokimya (Kre: 1.19 mg/dl, INR:0.9)

PA AKCİĞER GRAFİSİ

Basit ve kompleks strüktür





Courtesy C. Marquette

MALİGN HAVA YOLU OBSTRÜKSİYONLARI

PRİMER AKCİĞER TÜMÖRLERİ

- Akciğer karsinomu
- Karsinoid Ttümör
- Karsinosarkom
- Pulmoner sarkom
- Adepnoid kistik karsinom (ACC)
- Mukoepidermoid karsinom

MEDİASTİNAL TÜMÖRLER

- Timik karsinom
- Tiroid kanseri
- Germ hücreli tümörler (Teratoma, vs…)
- Larinks kanseri
- Özofagus kanseri
- Lenfoma (Hodgkin ve non-Hodgkin)
- Diğer tümörlere bağlı lenfadenopatiler

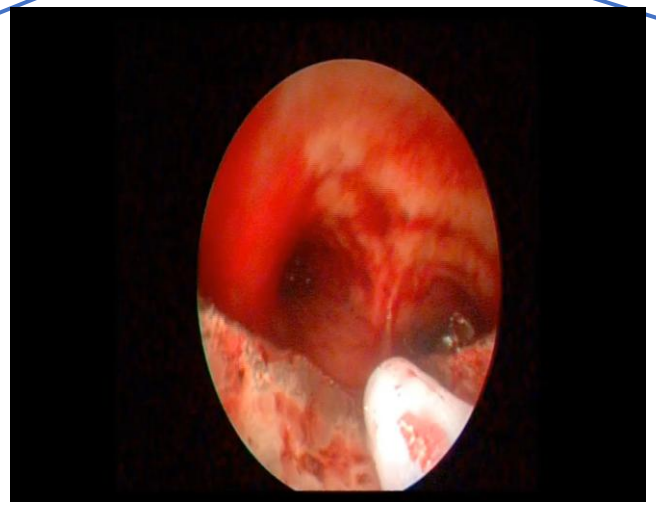
METASTATİK TÜMÖRLER

- Renal hücreli karsinom
- Meme kanseri
- Kolorektal karsinom
- Sarkom
- Melanom
- Over kanseri
- Uterus kanseri
- Testis kanseri
- Nazofarinks kanseri
- Adrenal karsinom
- Kronik Lenfositik Lösemi

TEDAVİ AMAÇLI BRONKOSKOPİ

- 1.Küratif
- Karsinoma in situ
- Periferik tümörler
- Bening hava yolu obstrüksiyonları
- 2.Palyatif
- Malign hava yolu obstrüksiyonları
- Hemoptizi
- Fistüller

KRİYOTERAPİ



ENDİKASYON

Kriyoablasyon

- Egzofitik tümör
- Erken evre tümör

- Kriyoadeziv etki
- Kriyorekanalizasyon
- Kriyobiopsi ve Kriyo TBB
- Yabancı cisim

GÜVENLİK

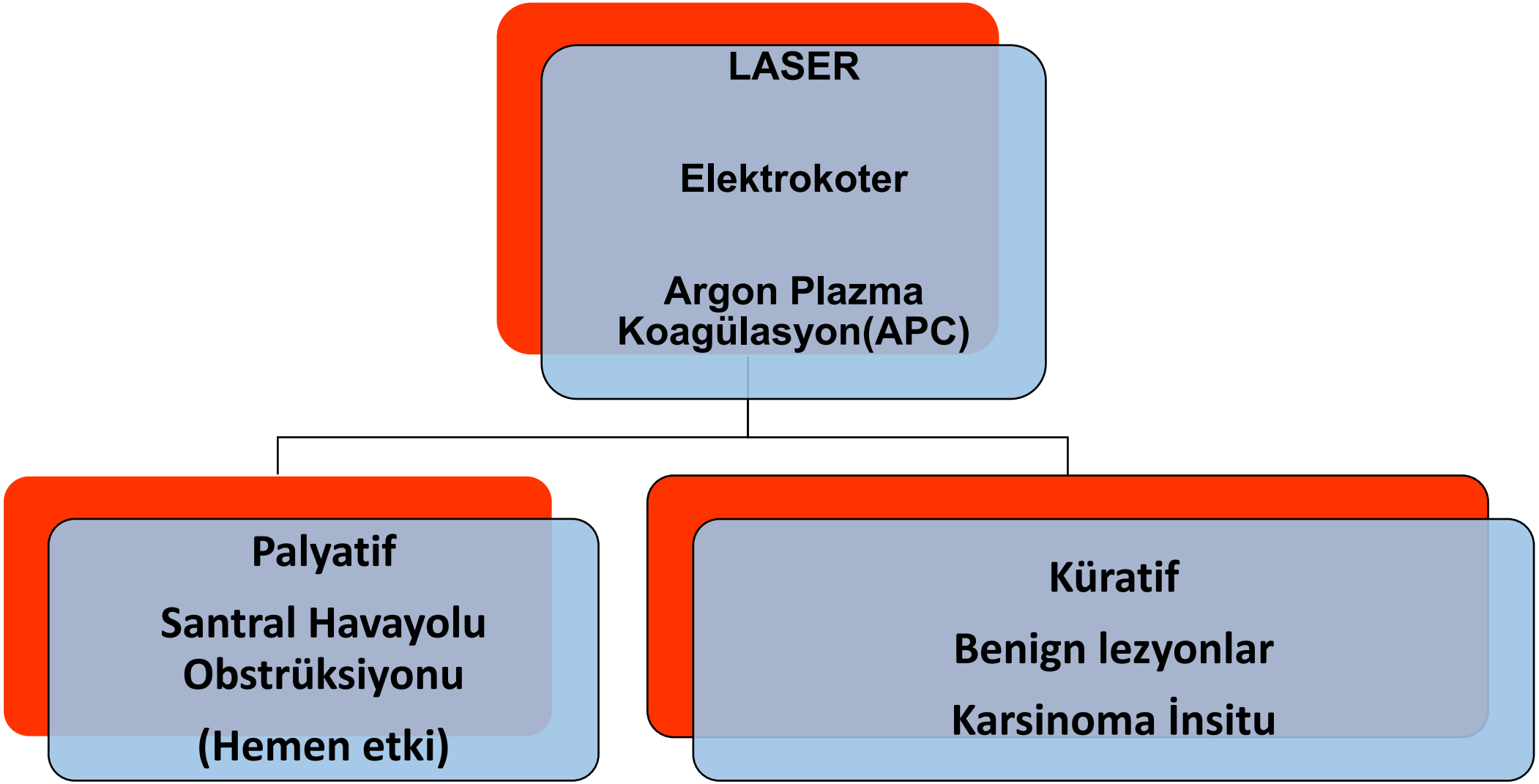
Perforasyon riski ↓↓

Rezidüel stenoz ↓

Genişlik → **10 mm**

Derinlik → **3 mm**

Endobronşiyal sıcak tedavi yöntemleri



LASER

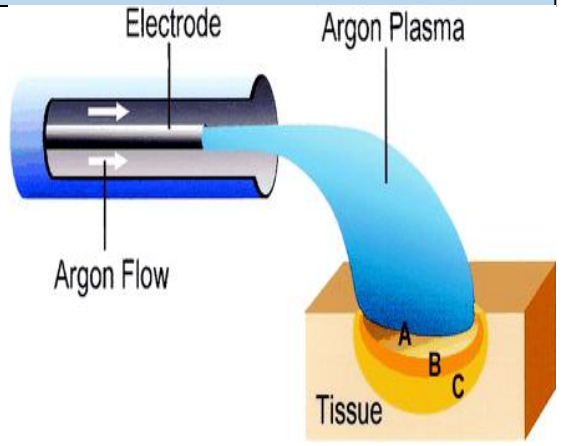
- **Aynı dalga boyu ve paralel ışık**
- **Dokular laser yoğun ışığını emer ve enerji büyük oranda ısı şeklinde açığa çıkar.**
- **Doku ışık etkileşimi**
- **Renksiz doku derin damarların koagülasyonu**
- **Renkli doku yüzeyel damarların koagülasyonu**

Argon plazma koagulasyon

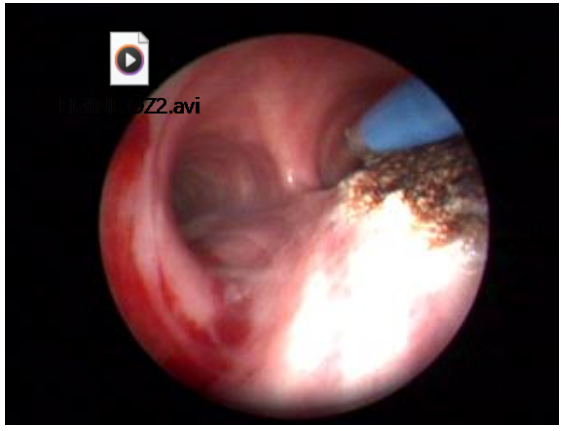
APC *nonkontak (doku teması yok)*

Yüksek voltajlı elektrik akımı ile termal koagülasyon sağlayan bir tür monopolar elektrokoterizasyondur.

- **Gücü 40-120 watt, uygulama süresi 2 sn altında olduğunda penetresyonu 3 mm derinliğe kadar iner.**
- **Rekanalizasyon başarısı %67-92**



Minimal manuplasyon ile daha geniş ve hızlı etki sağlayarak tümör koagülasyonu ve hemoptizi kontrolünde çok başarılı olur.



Stent granulasyon dokusu-APC

METALİK STENTLER

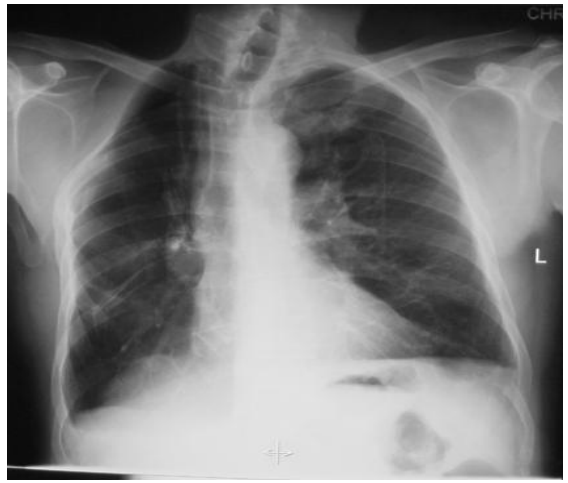
Stent konacak segmentin değişken çapı varsa

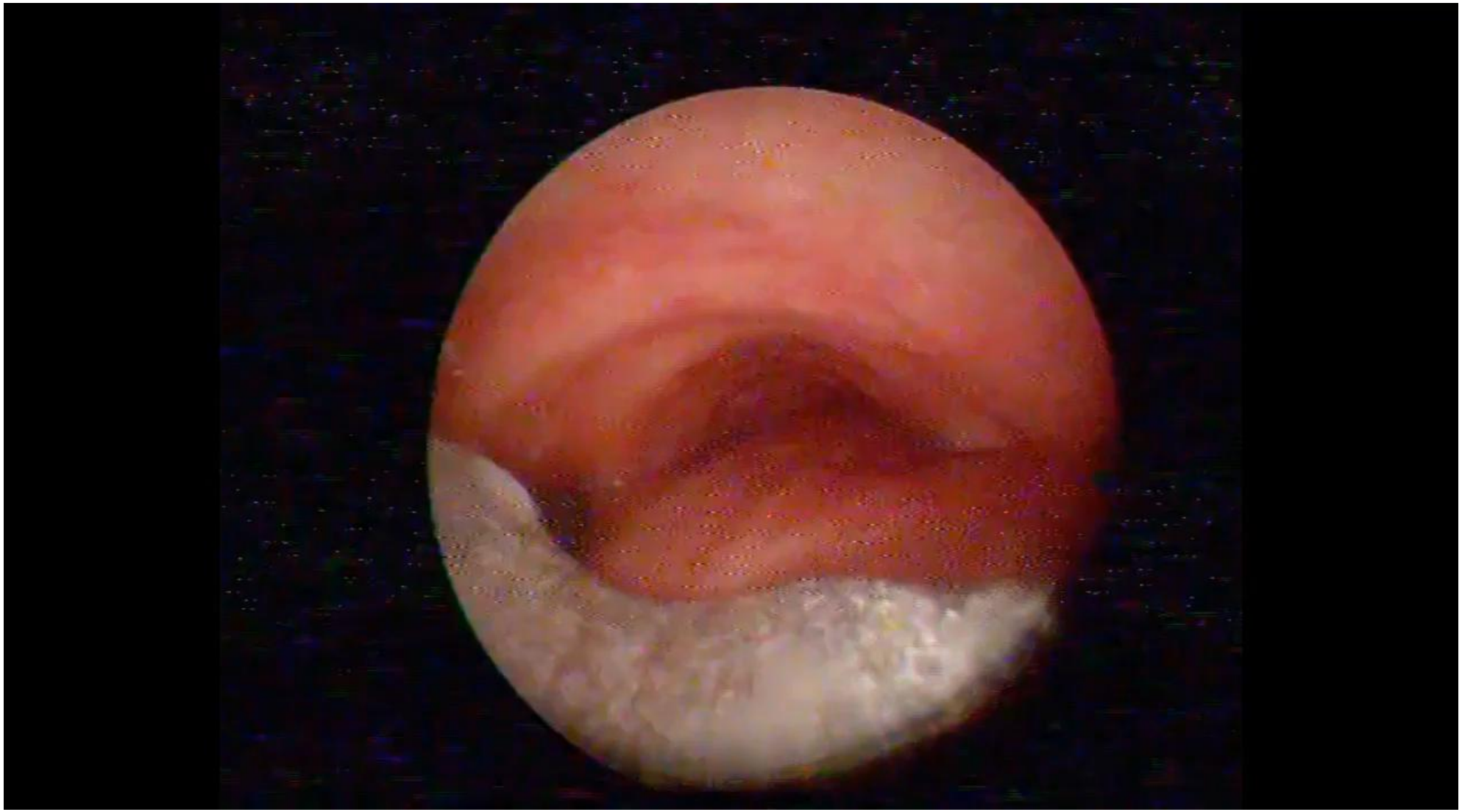
Ana bronşlarda distorsiyon olan olgularda

} Hava yolu dinamiklerine adaptasyon

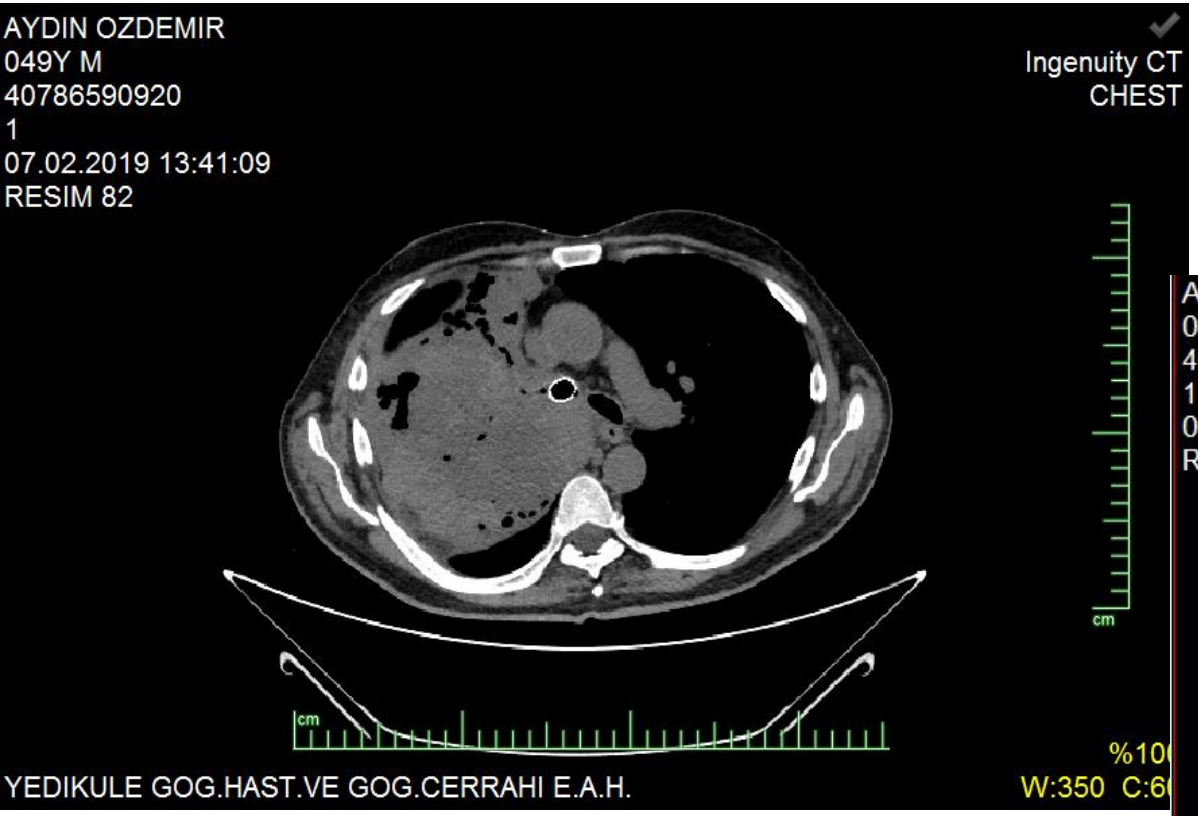
Kollateral ventilasyon için bir bronşiyal orifisi açık olarak korumak zorunda olduğunda

Segment rijid bronkoskop ile geçilemediğinde





OLGU


AYDIN OZDEMIR
049Y M
40786590920
1
07.02.2019 13:41:09
RESIM 82
Ingenuity CT
CHEST
cm
cm
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
W:350

AYDIN OZDEMIR
049Y M
40786590920
1
07.02.2019 13:41:09
RESIM 72
Ingenuity CT
CHEST
cm
cm
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
W:350

OLGU 5

- 76 yaşında, erkek
- Şikayeti: Nefes darlığı
- Hikayesi: Haziran 2021'de nefes darlığı başlayan hasta Van'da ileri tetkik edilirken, non-dignostik fleksibl bronkoskopik sonrası merkezimize refere edilmiş
- Özgeçmiş: HT, DM, Panik bozukluk (?)

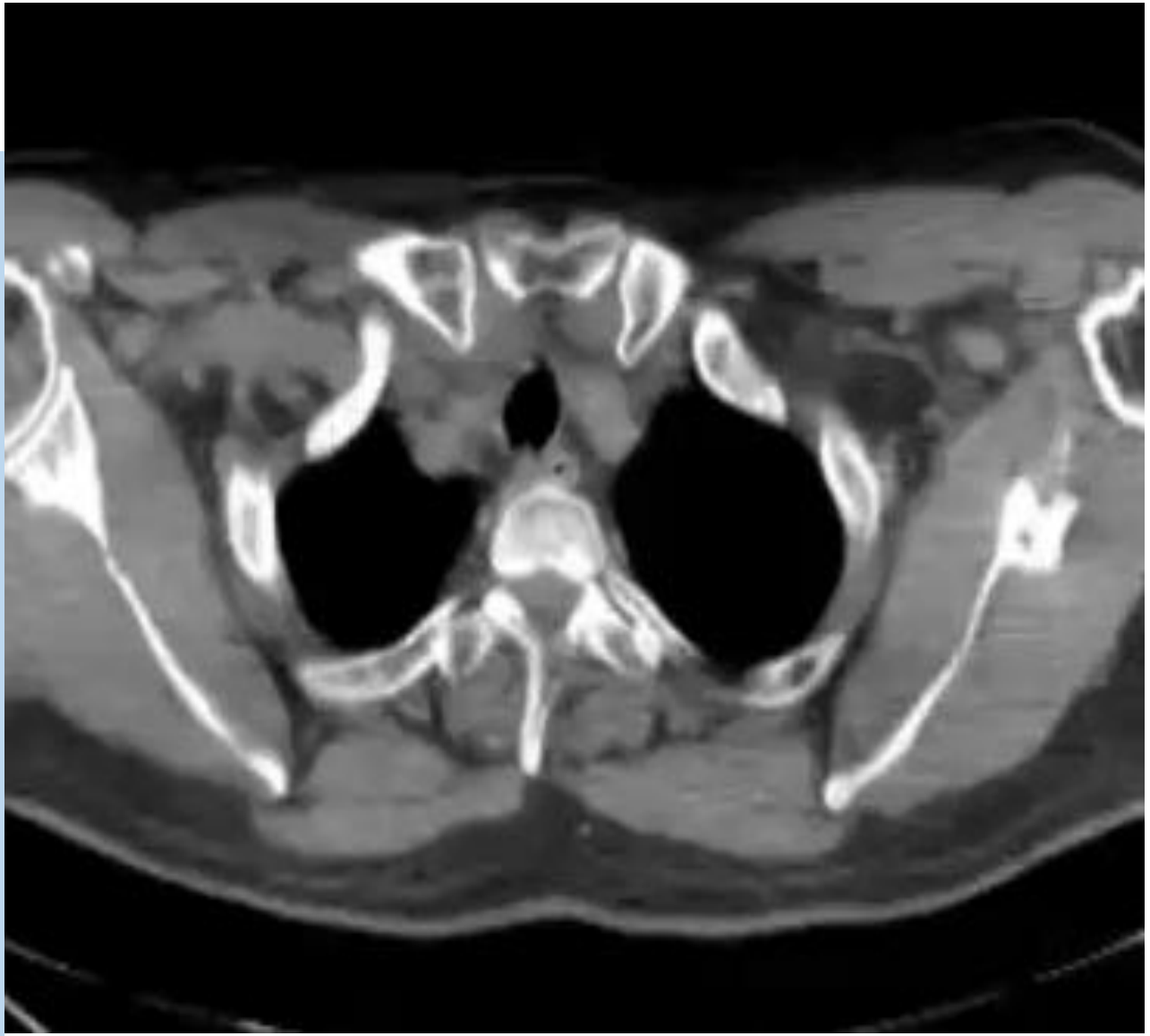
PA AKCİĞER GRAFİSİ

OLGU 5

- Alışkanlık: Bir özellik yok

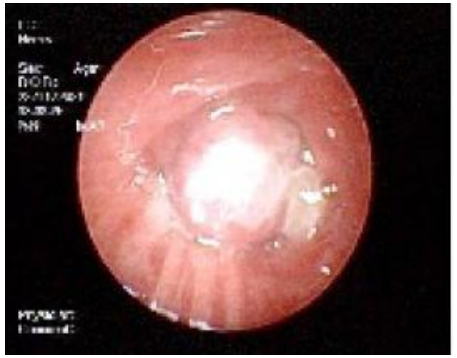
- Fizik Muayene:
  TA: 120/85 Sat: %93(oda) SDS: 22/dak
  Solunum sistemi: Sol akciğerde alt alanlarda solunum sesleri kaba

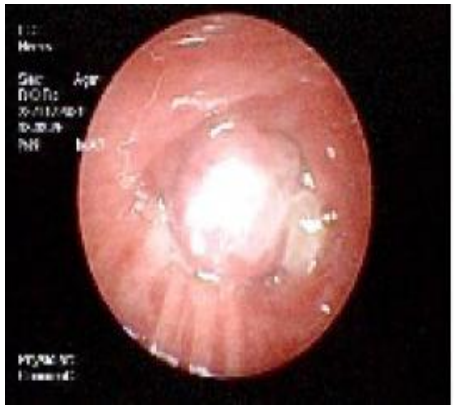
- Başvuru Laboratuar:
  Tüm laboratuar değerleri normal sınırlarda

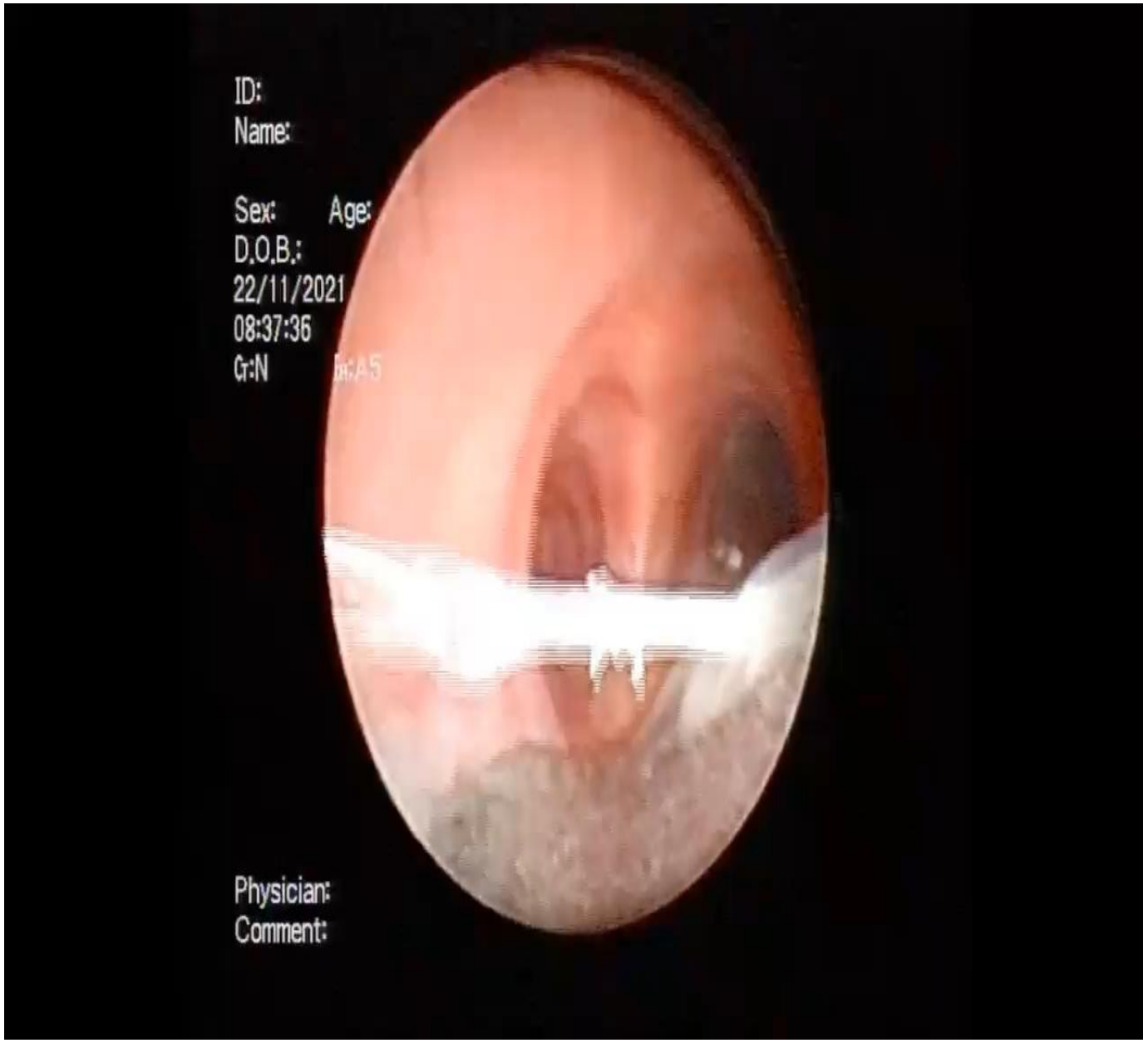


TORAKS BT

OLGU 5

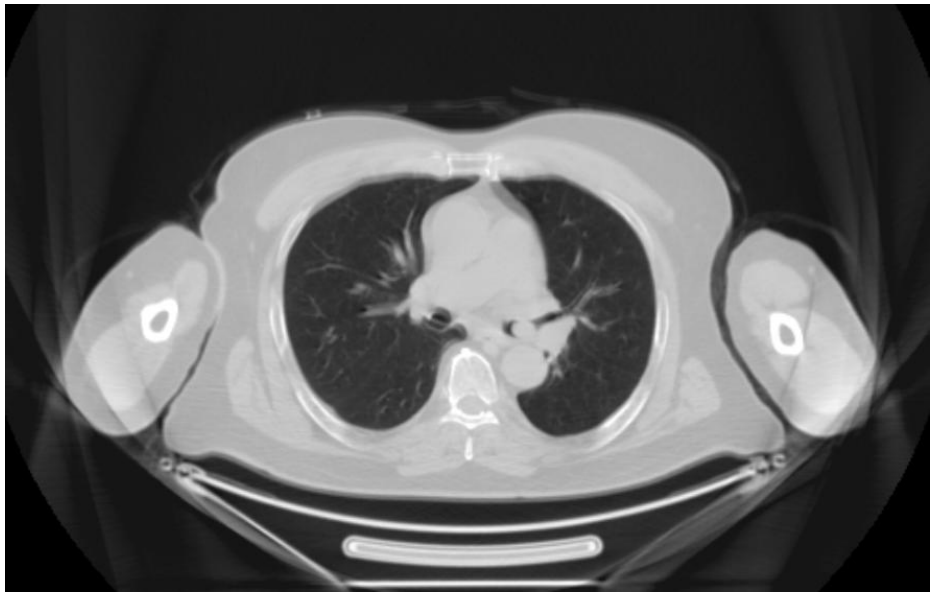


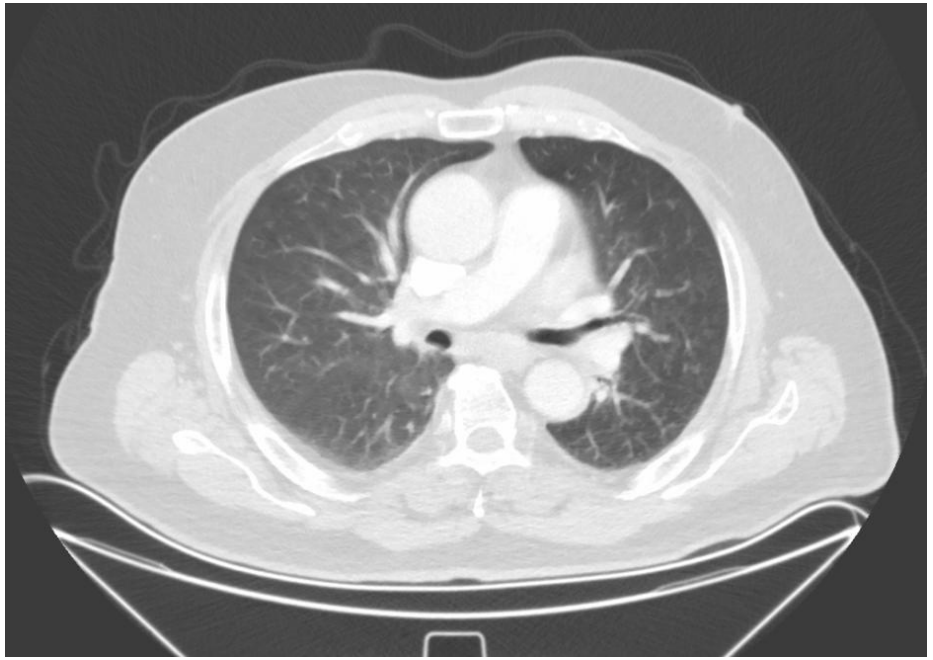




OLGU 5

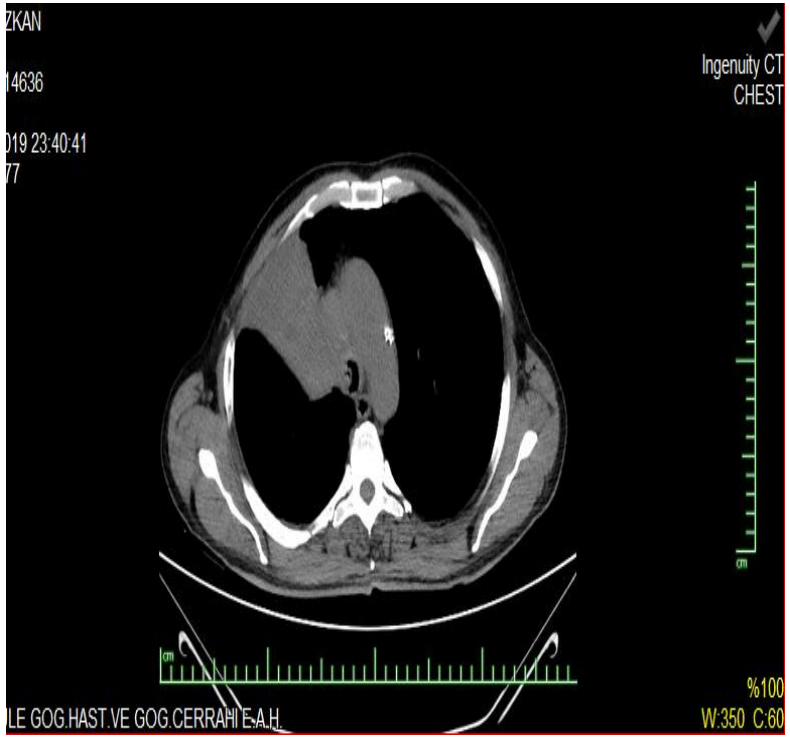
- Patolojisi «TİPİK KARSİNOİD TM» olarak raporlanmış
- GALYUM 68 DOTATATE PET istendi.

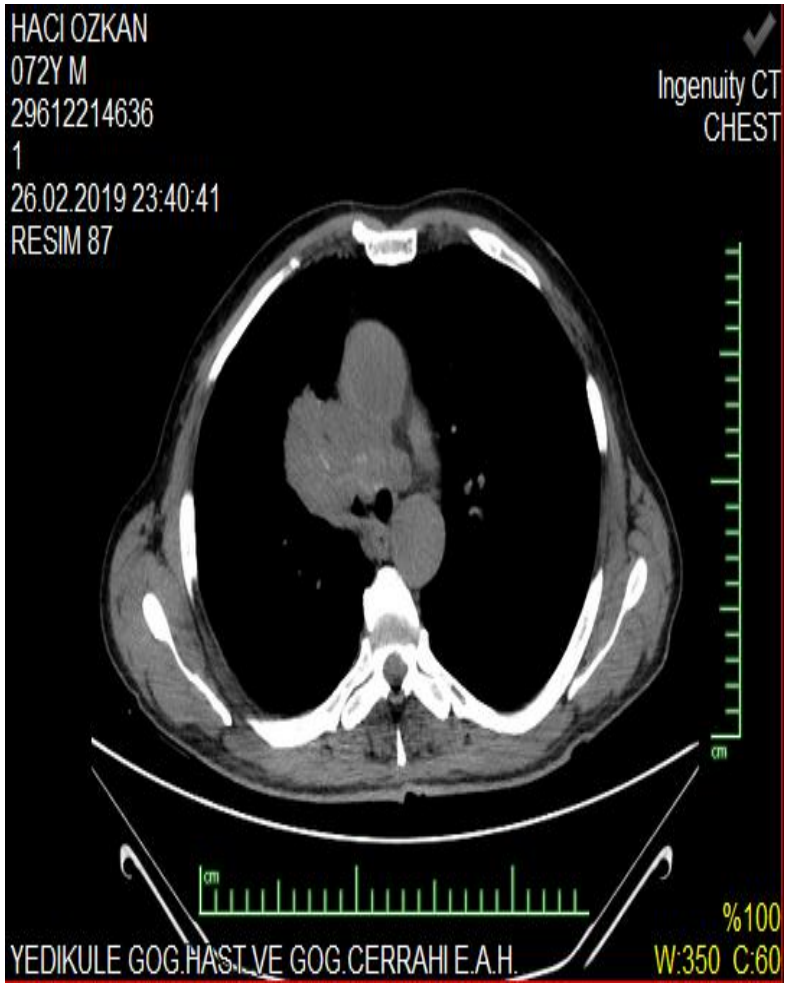


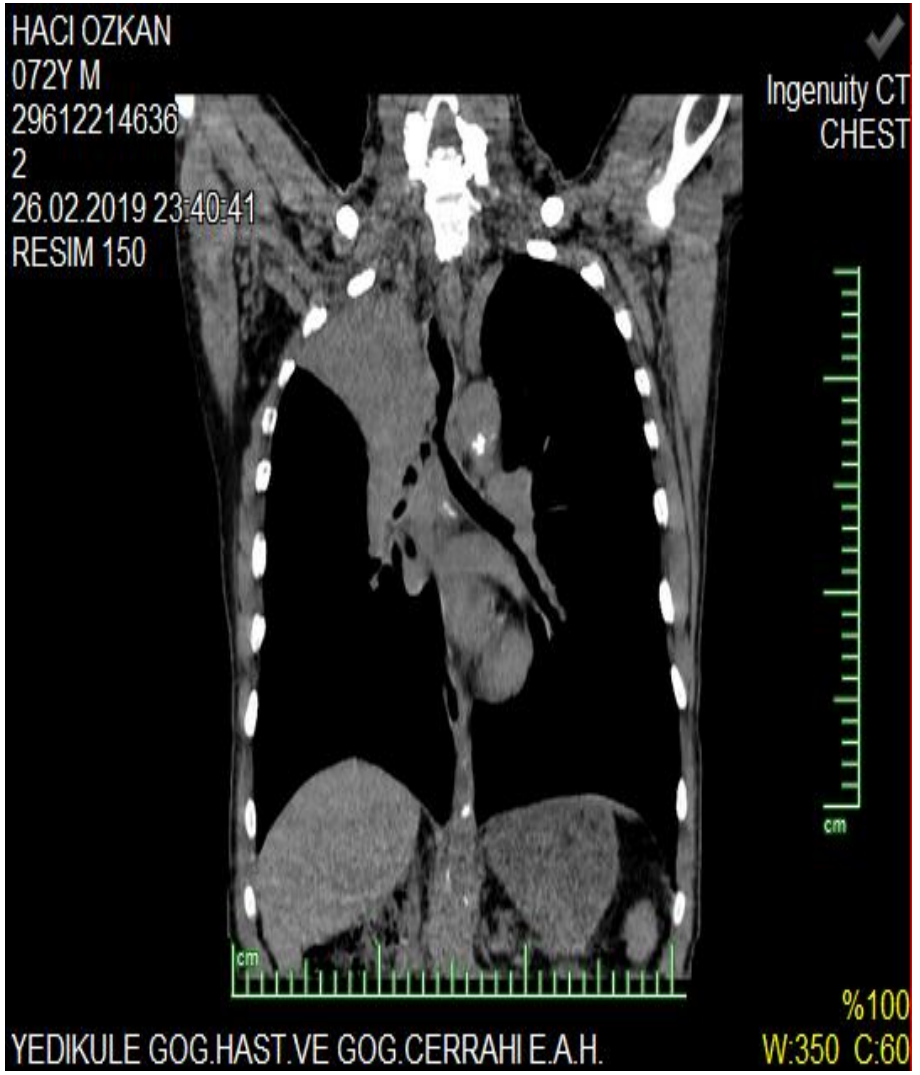


NEREYE

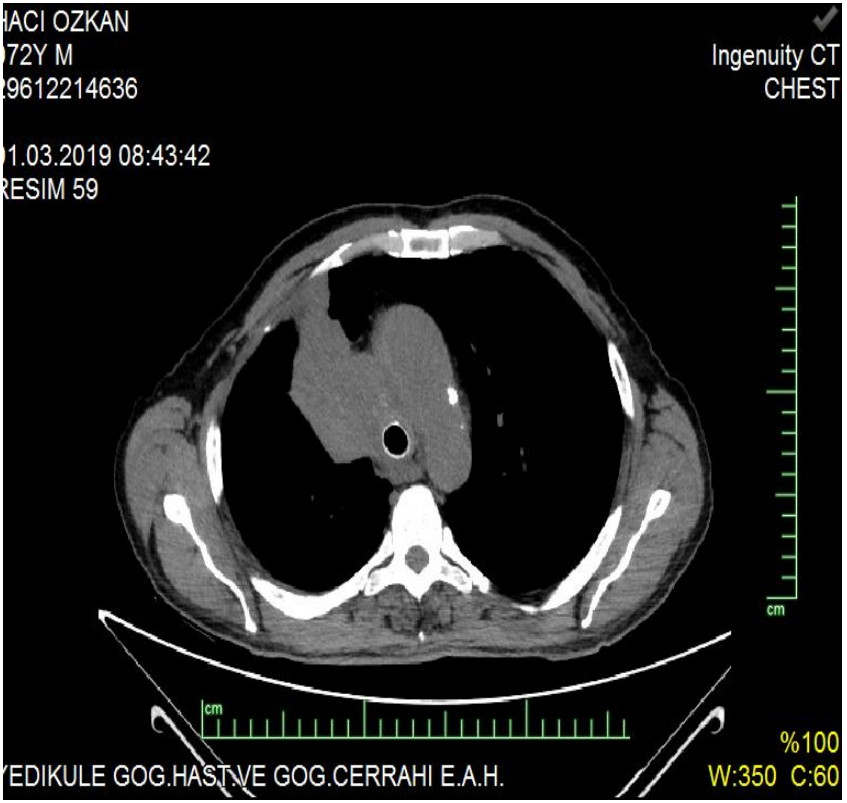
Olgu 8

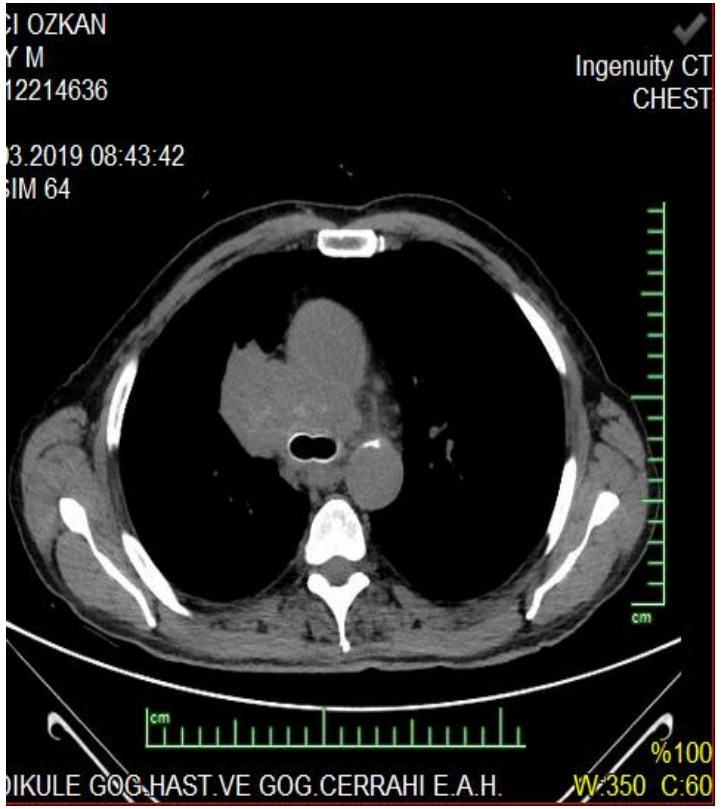

ZKAN
14636
019 23:40:41
77
Ingenuity CT
CHEST
%100
LE GOG.HAST.VE GOG.CERRAHI E.A.H.
W:350 C:60

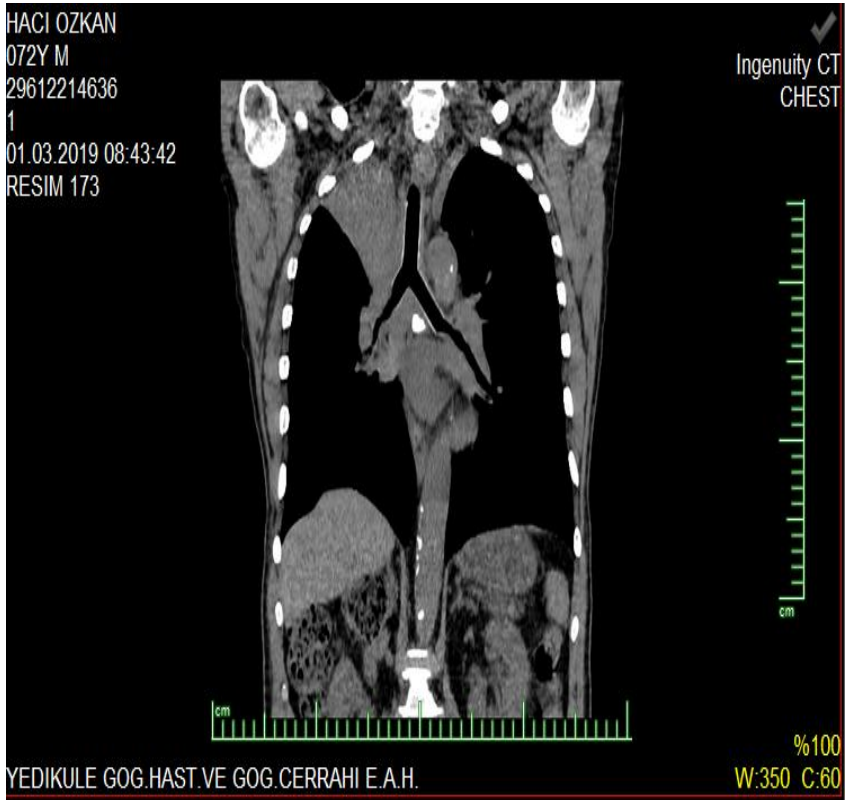

HACI OZKAN
072Y M
29612214636
1
26.02.2019 23:40:41
RESIM 87
Ingenuity CT
CHEST
%100
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
W:350 C:60


HACI OZKAN
072Y M
29612214636
2
26.02.2019 23:40:41
RESIM 150
Ingenuity CT
CHEST
%100
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
W:350 C:60

Olgu 8


HACI OZKAN
072Y M
29612214636
01.03.2019 08:43:42
RESIM 59
Ingenuity CT
CHEST
cm
%100
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
W:350 C:60


I OZKAN
Y M
12214636
3.2019 08:43:42
IM 64
Ingenuity CT
CHEST
cm
%100
IKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
W:350 C:60


HACI OZKAN
072Y M
29612214636
1
01.03.2019 08:43:42
RESIM 173
Ingenuity CT
CHEST
cm
%100
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
W:350 C:60

KLİNİK BULGULAR ve ANAMNEZ

Şikayetler

Öksürük
Nefes darlığı
Hemoptizi
Wheesing
Stridor

} Darlığın yeri
Darlığın oranı
Darlığın uzunluğu
Hastanın kardiyopulmoner rezervi

Şikayetlerin Başlangıcı

Akut
Yavaş İlerleyici

Trakea çapı

Ön-Arka: 18 mm Lateral Çap: 23 mm

< 8 mm } Egzersiz dispnesi

<5 mm } İstirahat dispnesi

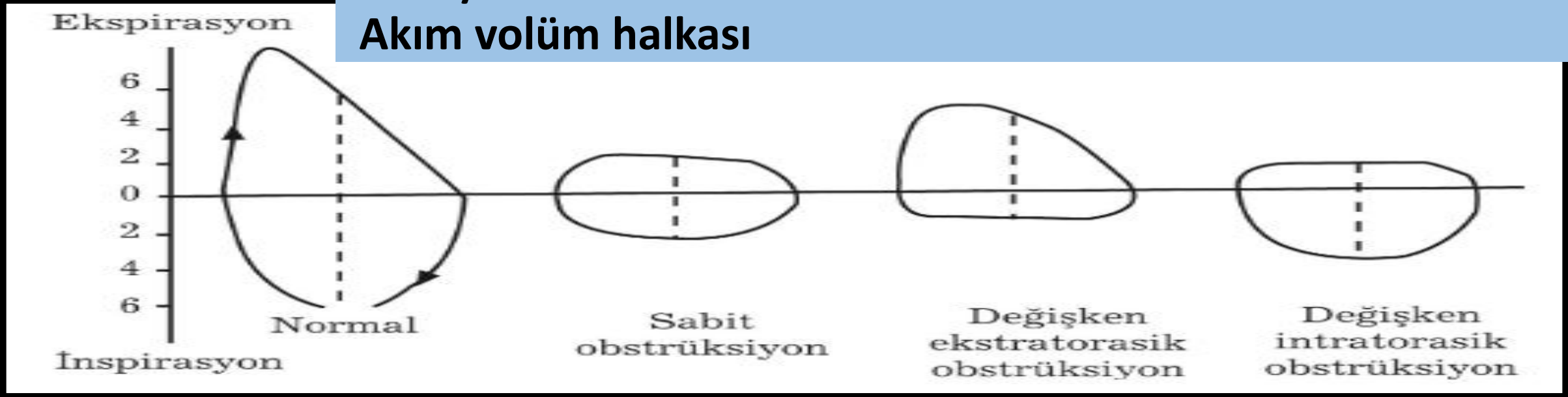
Tedavi metodu	Endikasyonlar	Kontrendikasyonlar	Komplikasyonlar	Uyarı
Elektrokoter (snare, forceps, Probe) (hızlı etkili)	*Hemoptizi *Endobronşiyal tümör debulking	*Fi02 >0.4 *Ekstralüminal Hastalık *Total hava yolu obstüksiyonunun distalinin açık olmaması	*Hemoraji %1.8 *Hava yoluda yanık *Hava yolu perforasyonu *Pnömotoraks	*Pacemaker * Fi02<0.4
APC (hızlı etkili)	*Hemoptizi *Endobronşiyal tümör debulking	*Fi02 >0.4 *Ekstralüminal Hastalık *Hava yolu obstüksiyonunun distalinin açık olmaması	*Hava yolunda yanık *Perforasyonu %1.4 *Pnömotoraks *Gaz embolisi	*Pacemaker
Lazer (CO_2, argon, diot, Nd-YAG ve Nd-YAP (hızlı etkili)	*Endobronşiyal tümör debulking	*Trakeoösefageal fistül *Ekstralüminal Hastalık *Total hava yolu obstüksiyonunun distalinin açık olmaması	*Masif Hemoraji %1 *Pnömotoraks %0.4 *Pnömomediastinum %0.2 *Hava yolunda yanık	*Fi02<0.4
Mikrodebrider (hızlı etkili)	*Endobronşiyal tümör debulking	*Distal lezyonlar	*Pnömotoraks *Enfeksiyon *Hemoraji	
Kriyoterapi (geç etkili)	*Endobronşiyal tümör debulking	*Acil girişim gereken akut hava yolu obstrüksiyonları	*Pnömotoraks *Hemoraji	
Brakiterapi (geç etkili)	*Endobronşiyal veya peribronşiyal tümör tedavisi	*Trakeoösefageal fistüllerin tedavisinde	*Radyasyon bronşiti *Hava yolu stenozu *Masif hemoraji *Bronşiyal nekroz *Hava yolu fistül	*Pahalı *Sağlık personelinin koruma tedbirleri
Fotodiamik Terapi (geç etkili)	*Endobronşiyal veya peribronşiyal tümör tedavisi	*Santral hava yolu Obstrüksiyonları *Özefagus ve ana damarlara invaze tümör *Porfiria hastalığı ve fotosensitif hastalar	*Masif Hemoptizi *Bronkoplevral fistül *Subepitelyal fibrozis	*Fotosensiti-vite(birkaç hafta sürebilir)

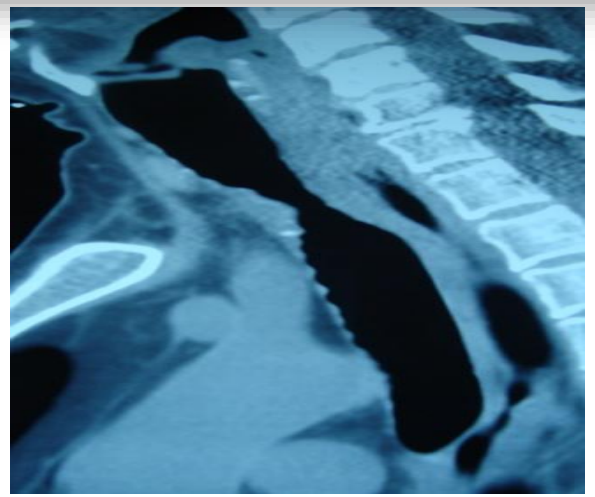
Patrick D, Mitchell • Marcus P. Kennedy .Bronchoscopic Management of Malignant Airway Obstruction. Adv Ther (2014) 31:512–538 DOI 10.1007/s12325-014-0122-z

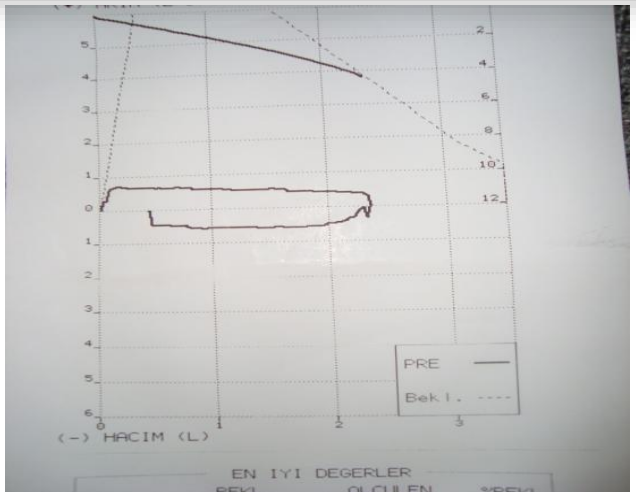
Santral Havayolu Obstrüksiyonun Tanısı

FEV1/PEF 8

Akım volüm halkası







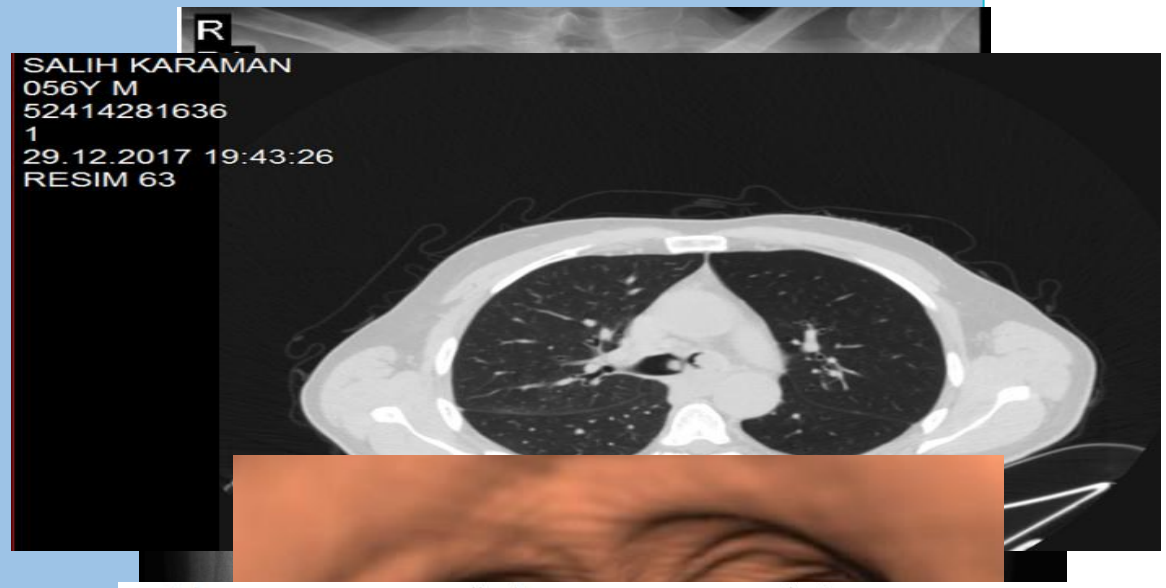
Görüntüleme Yöntemleri:

PA Akciğer Grafisi

Toraks BT

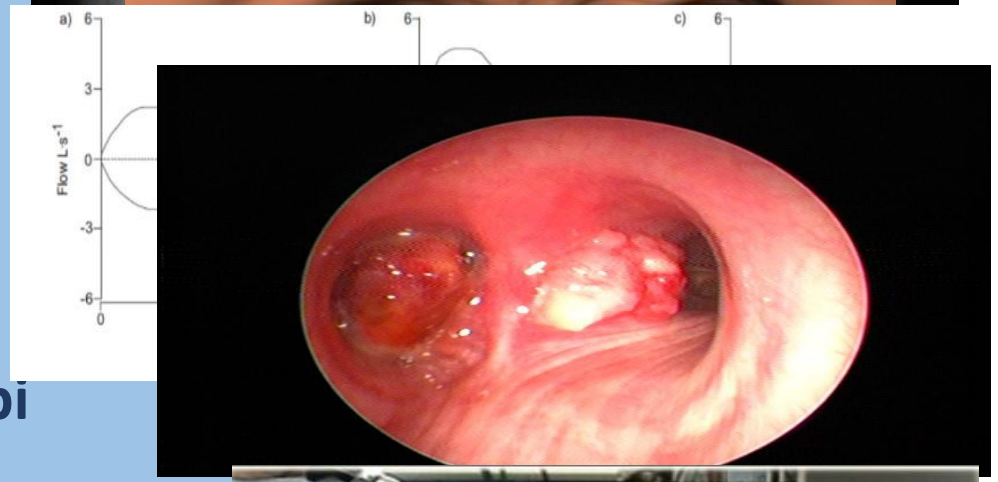
Dinamik Çekim Toraks BT

Sanal Bronkoskopi



Fizyolojik Değerlendirme:

Solunum Fonksiyon Testi



Bronkoskopik Değerlendirme:

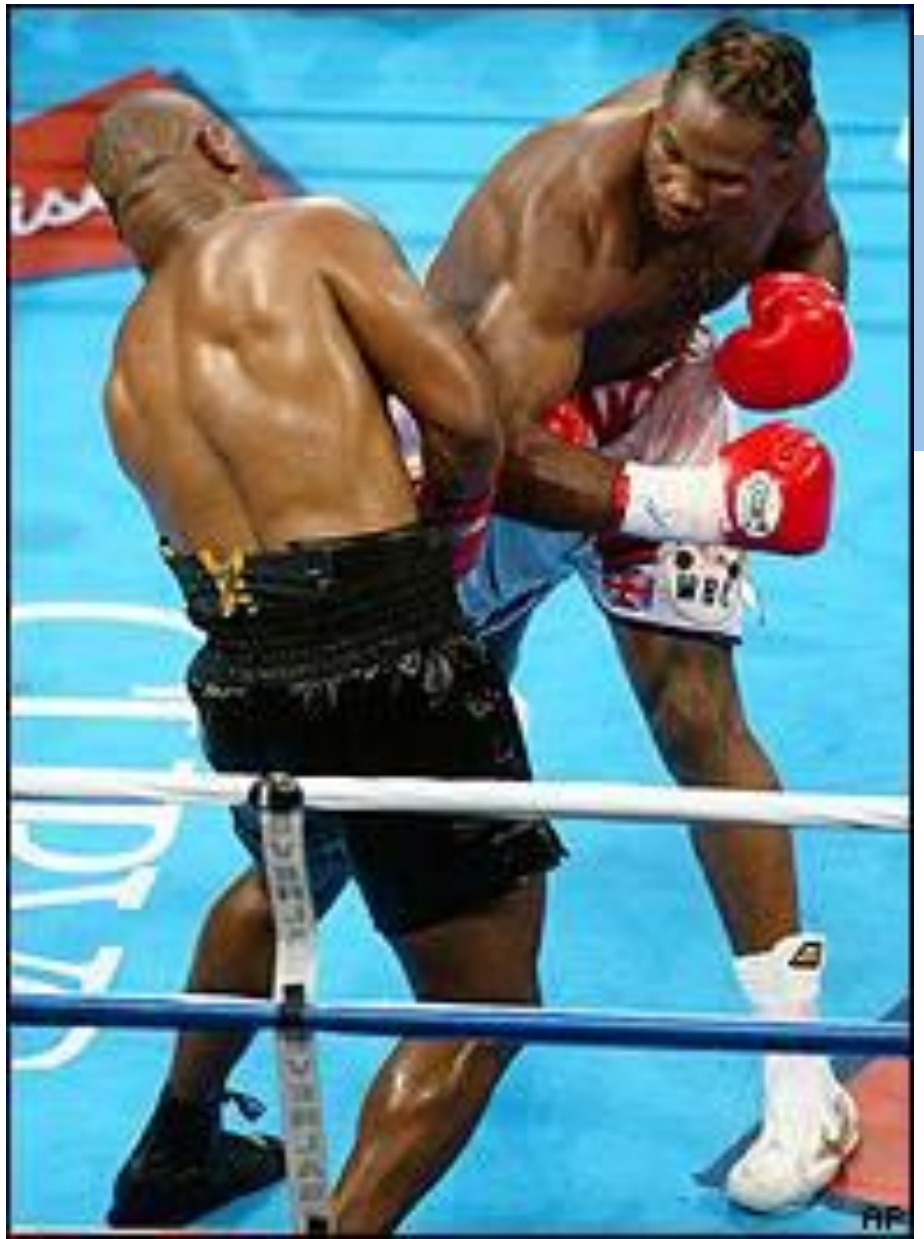
Fleksible Bronkoskopi

Rijid Bronkoskopi

EKİBİZ

ENDOBRONŞİAL TEDAVİ

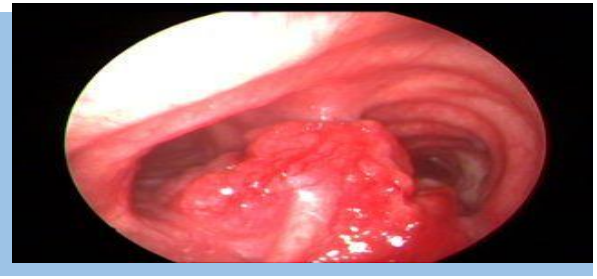
CERRAHİ TEDAVİ



KEMOTERAPİ

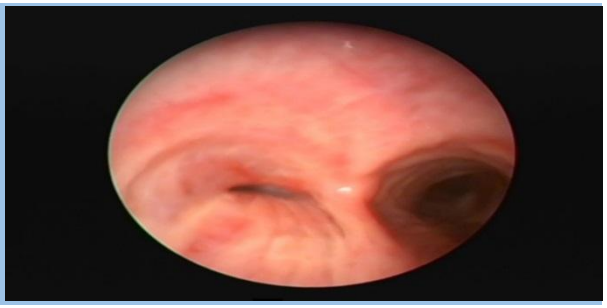
RADYOTERAPİ

- Ana karina tutulumu



- Trakea distal veya orta hat lezyonları

- Ana bronşlar proksimalinde stenoz



- Trakeoözafegial fistül

Semptomlar

Dispne

Darlığın yeri,derecesi ve uzunluğu

Stridor 8 mm egzersiz

5 mm istirihat

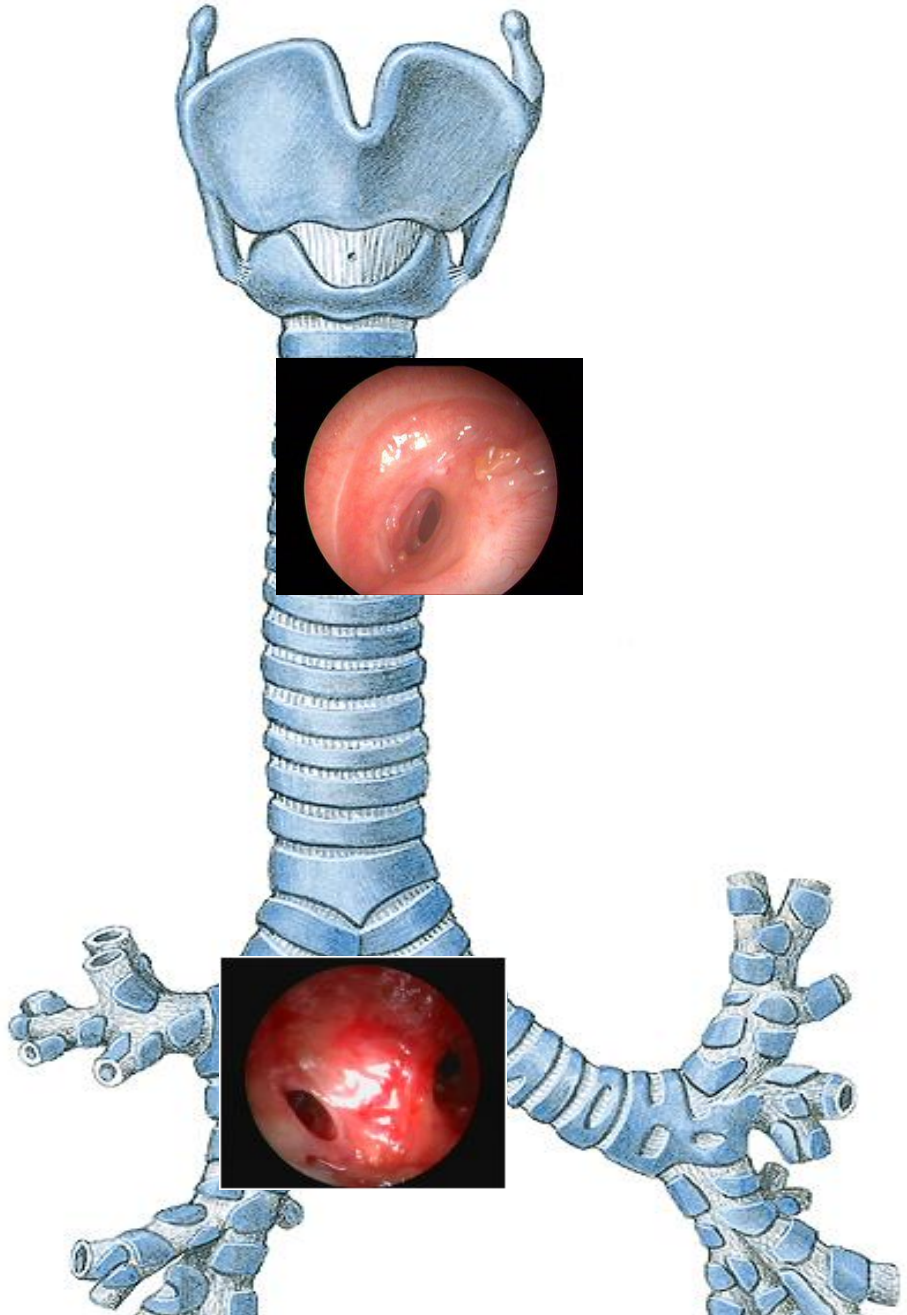
Bronkodilatöre yanıt vermeyen dispne

Ekstubasyon başarısızlığı

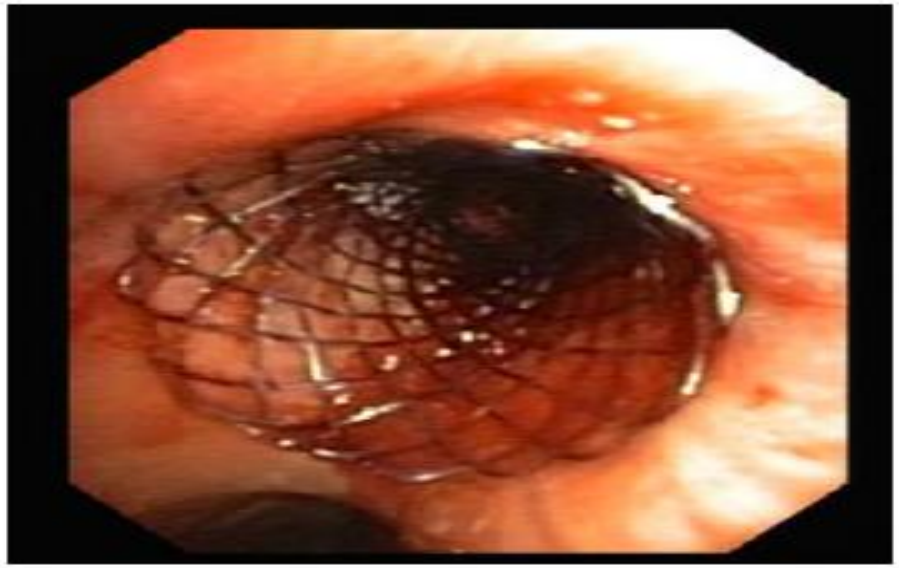
Öksürük

Hemoptizi

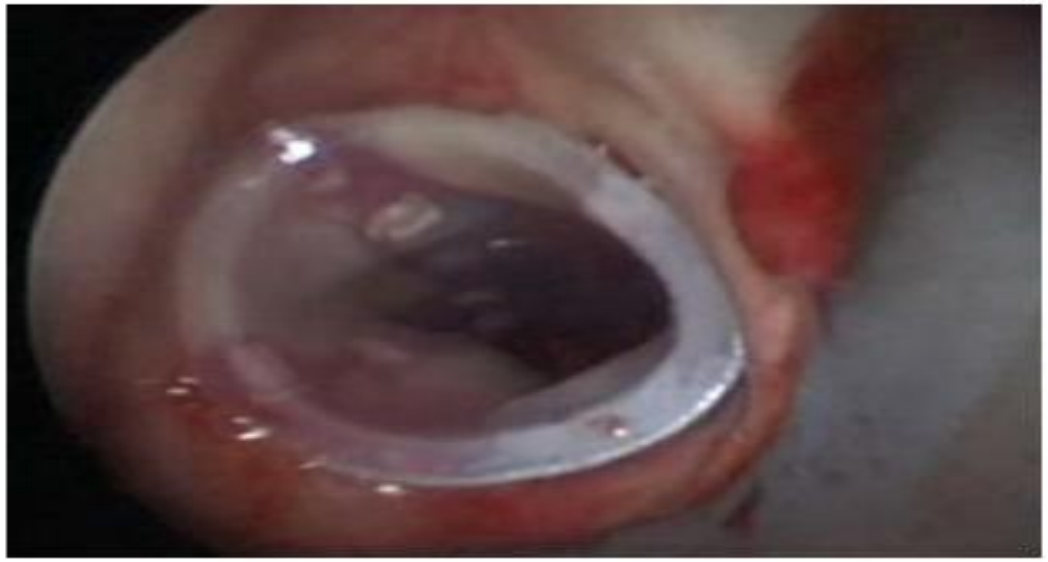
Pnömoni



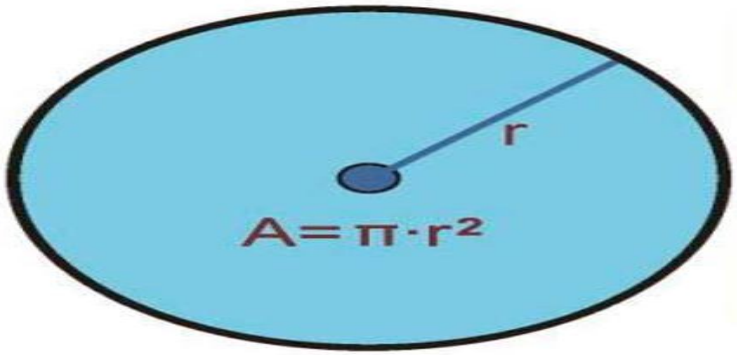
Farklı duvar kalınlıkları



0.25 mm



1.5 mm



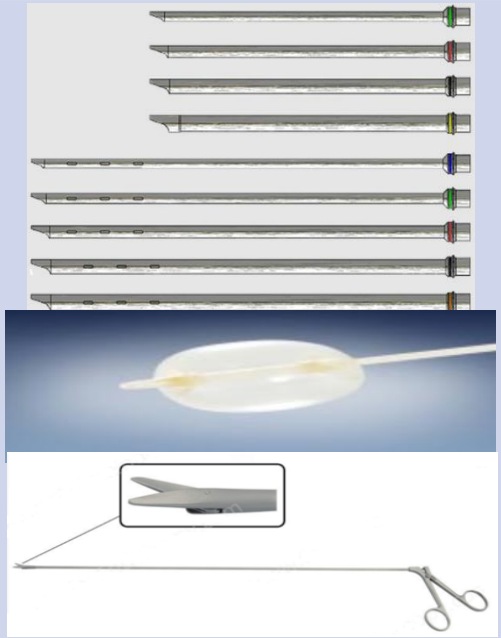
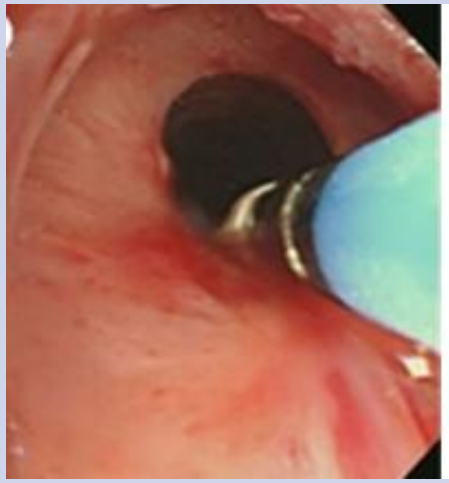
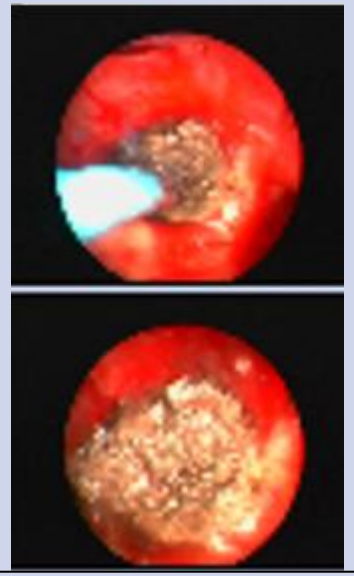
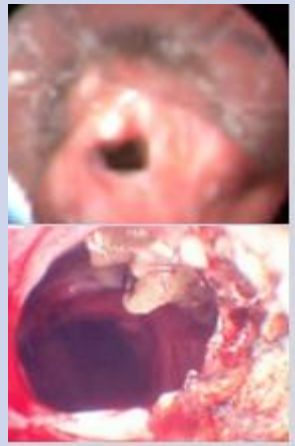
	Ext Diam	Int Diam	r	Area
SILICONE SEMS	14	11	5.5	95.03
SEMS	14	13.5	6.75	143.13
				48.105 mm2

BENİNG HAVA YOLU OBSTRÜKSİYONLARI

- Posttravmatik Hava Yolu Obstrüksiyonları
- Dinamik Ekspiratuar Hava Yolu Darlıkları
- Dış Bası
- Cerrahi Sonrası
- Enfeksiyonlar
- İnflamatuar Hava Yolu Hastalıkları
- **Benign Endobronşiyal Tümörler**

→

- **Benign Endobronşiyal Tümörler**
  - Respiratuar papillomatozis
  - Hamartom
  - Fibrom
  - Leiomiyom
  - Lipom
  - Onkositom
  - Nörojenik tümör
  - Pleomorfik adenom
  - Trakeobronkopatia osteokondroplastika

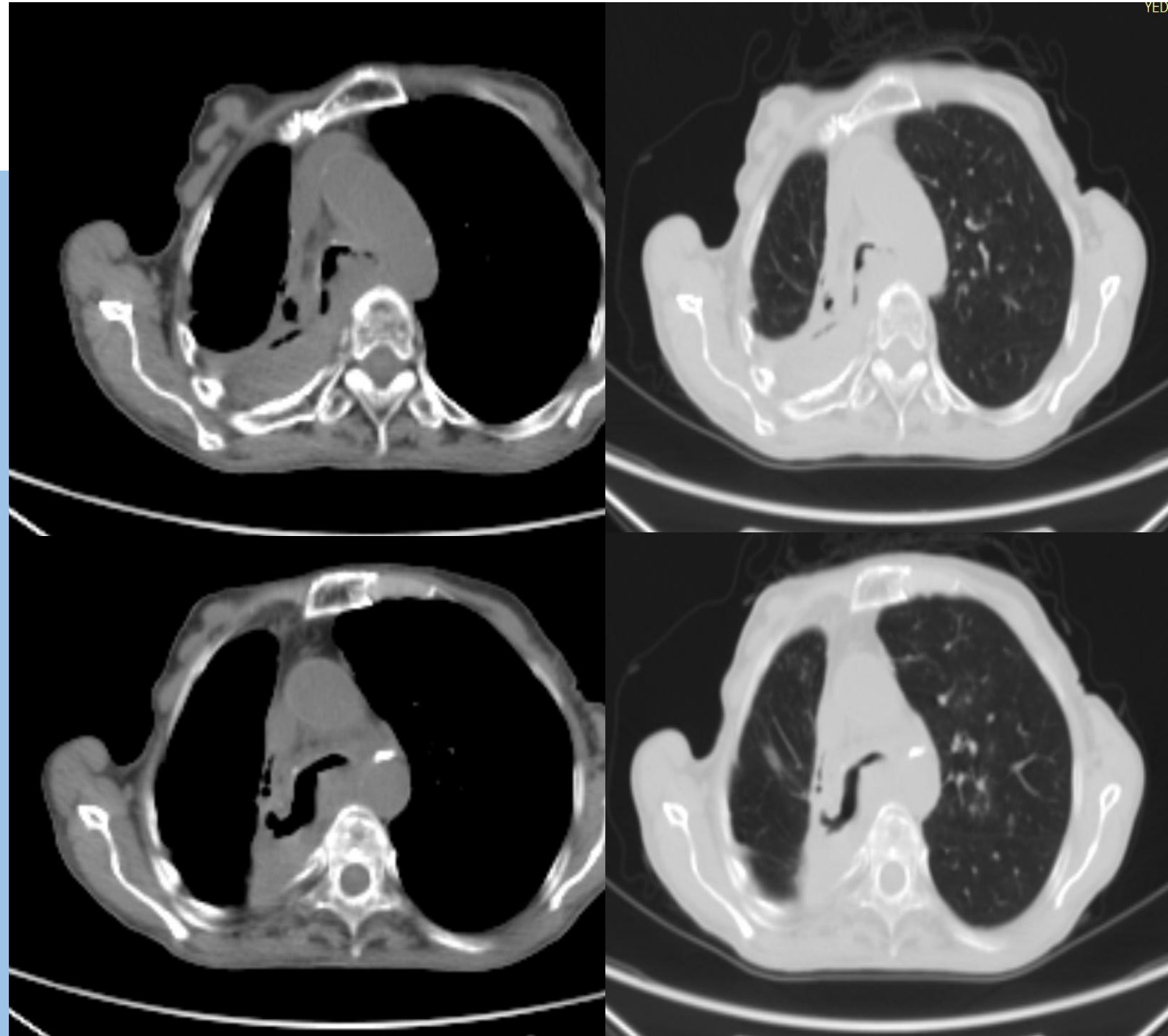
Mekanik Dilatasyon	Kriyo	Sıcak Yöntemler		
• Artan çaplarda rijid tüp ile dilatasyon, balon, makas • Hızlı etkili daha az zaman alıcı • Başarı oranı %40-100 • Komp: Laserasyon, rüptür, px, hemoraji	• N2O • Koagülasyon ve nekroz • Hemoraji riski düşük • Geç etkili	APC	Lazer	Elektokoter
		Hızlı etkili Yüzeyel penetrasyon Hemoraji riski düşük	Koagülasyon Hızlı etkili Hemoraji riski düşük	Koagülasyon ve buharlaşma Komp: Perforasyon
				

*Recurred Post-intubation Tracheal Stenosis Treated with Bronchoscopic Cryotherapy :Ye-Ryung Jung, Joon Taek Jeong, Myoung Kyu Lee, Sang-Ha Kim, Suk Joong Yong, Seok Jeong Lee and Won-Yeon Lee; Intern Med 55: 3331-3335, 2016

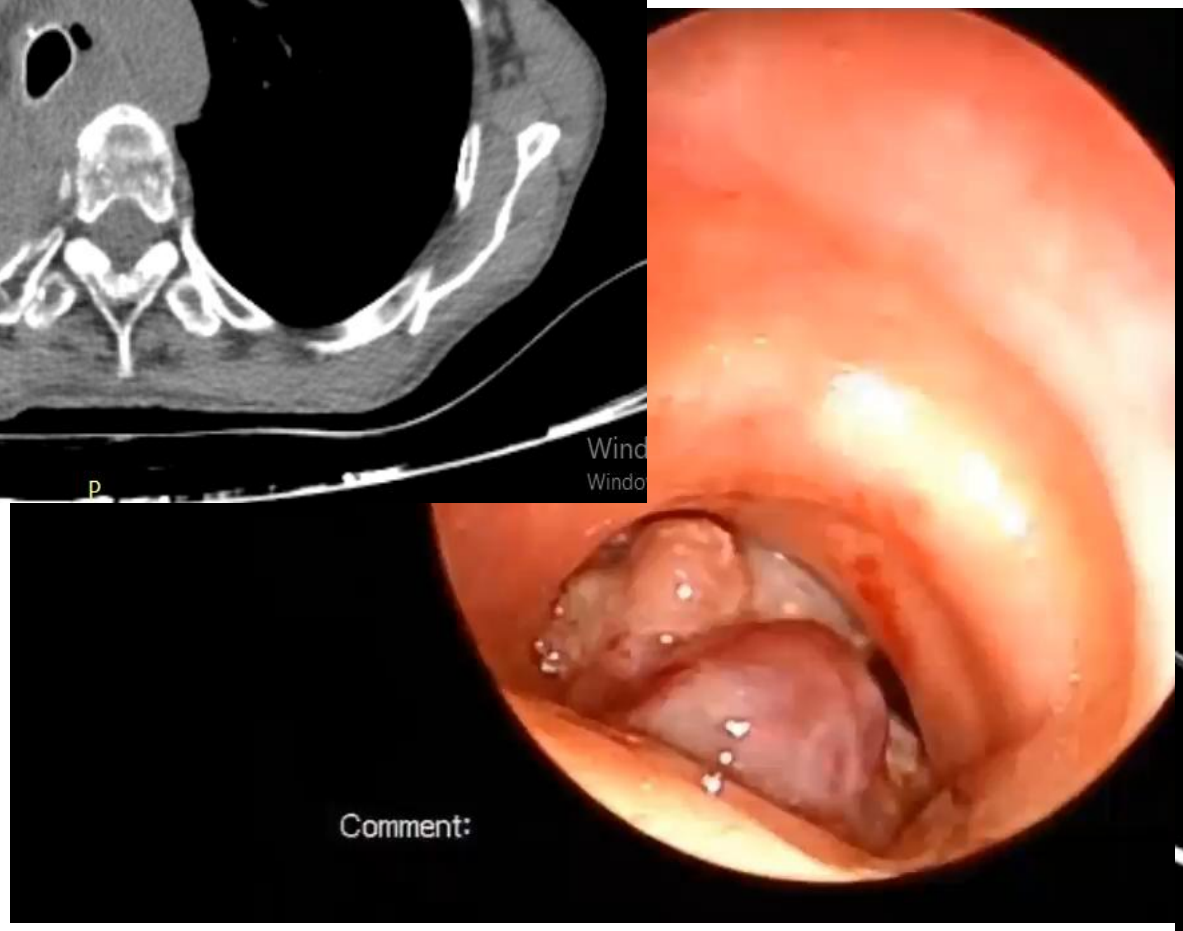
*Argon plasma coagulation in treatment of post intubation tracheal stenosis: HamidReza Jabbardarjani, Arda Kiani, Negar Sheikhi, Mohammadreza Masjedi; European Respiratory Journal 2012 40: P669

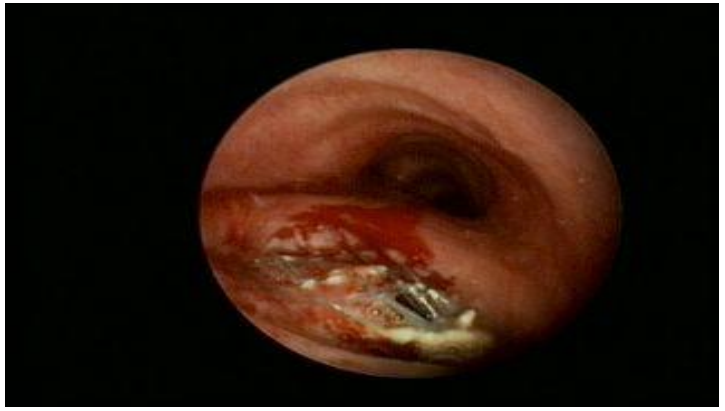
OLGU 2

- 70 yaş kadın hasta
- ÖZEFAGUS CA(SCC),
- MEME CA (İNVAZİV DUKTAL KARSİNOM) TANILI HASTA
- Dispne ve hemoptizi



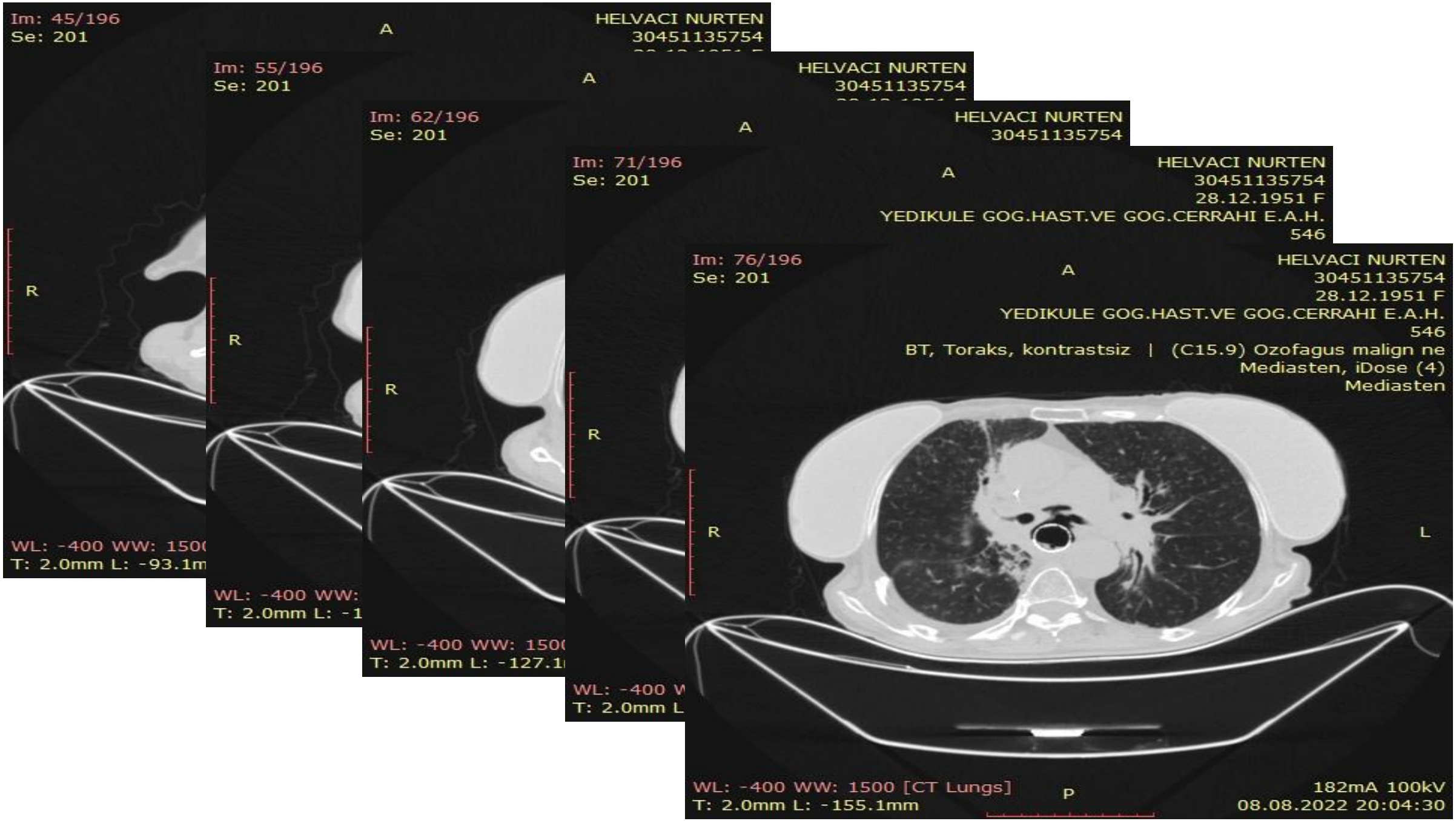
OLGU 2



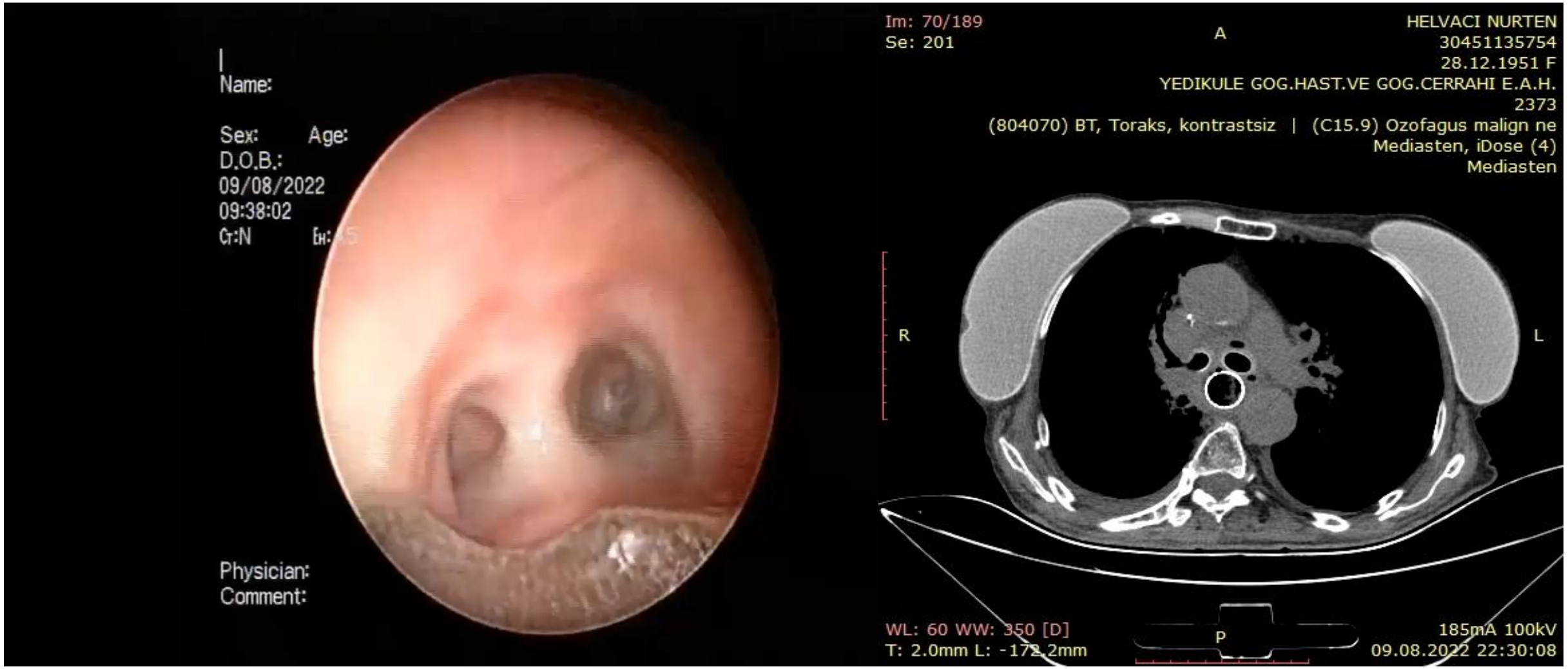


MALİGN FİSTÜL

- **Bronkoplevral fistül vakalarında hava kaçağını azaltmak için**
- **Özafagus fistül vakalarında aspirasyondan kaçınmak için**
- **Mediasten fistül vakalarında mediasten enfeksiyonunu önlemek için**


Im: 45/196
Se: 201
A
HELVACI NURTEN
30451135754
R
WL: -400 WW: 150
T: 2.0mm L: -93.1m
Im: 55/196
Se: 201
A
HELVACI NURTEN
30451135754
R
WL: -400 WW:
T: 2.0mm L: -1
Im: 62/196
Se: 201
A
HELVACI NURTEN
30451135754
R
WL: -400 WW: 150
T: 2.0mm L: -127.1
Im: 71/196
Se: 201
A
HELVACI NURTEN
30451135754
R
WL: -400 W
T: 2.0mm L
Im: 76/196
Se: 201
A
HELVACI NURTEN
30451135754
28.12.1951 F
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
546
BT, Toraks, kontrastsiz | (C15.9) Ozofagus malign ne
Mediasten, iDose (4)
Mediasten
R
L
WL: -400 WW: 1500 [CT Lungs]
T: 2.0mm L: -155.1mm
P
182mA 100kV
08.08.2022 20:04:30

OLGU 6


Name:
Sex: Age:
D.O.B.:
09/08/2022
09:38:02
Physician:
Comment:
Im: 70/189
Se: 201
A
HELVACI NURTEN
30451135754
28.12.1951 F
YEDIKULE GOG.HAST.VE GOG.CERRAHI E.A.H.
2373
(804070) BT, Toraks, kontrastsiz | (C15.9) Ozofagus malign ne
Mediasten, iDose (4)
Mediasten
R
L
P
WL: 60 WW: 350 [D]
T: 2.0mm L: -172.2mm
185mA 100kV
09.08.2022 22:30:08

> Turk Gogus Kalp Damar Cerrahisi Derg. 2022 Apr 27;30(2):216-226.
doi: 10.5606/tgkdc.dergisi.2022.20831. eCollection 2022 Apr.

Use of airway stents to treat malignant tracheobronchial fistulas: Our six-year experience

Ekrem Cengiz Seyhan [1], Demet Turan [1], Mehmet Akif Özgül [1], Efsun Uğur Chousein [1], Güler Özgül [2], Erdoğan Çetinkaya [1]

Background: This study aims to investigate the indications, safety, complications, and long-term outcomes of airway stenting in the treatment of malignant tracheobronchial fistulas.

Methods: The medical records of a total of 34 patients (24 males, 10 females; mean age: 55.4+13 years; range, 23 to 76 years) with malignant tracheobronchial fistulas treated with airway stenting between February 2014 and August 2020 were retrospectively analyzed. Data including demographic features, diagnosis, symptoms, treatment, complications and outcomes were recorded.

Results: Thirty-eight airway stents were inserted in 34 patients with malignant tracheobronchial fistulas, including 19 patients with malignant tracheobronchial esophageal fistulas and 15 patients with bronchopleural fistulas. The clinical success and the technical success rates were 91% and 100%, respectively. No perioperative death or severe complications occurred. Chronic complications (>24 h) occurred in eight (23%) patients with malignant tracheobronchial fistula. Median follow-up was 3.5 (range, 1.4 to 5.5) months in patients with malignant tracheobronchial esophageal fistulas and 18 (range, 9.5 to 26.5) months in patients with bronchopleural fistulas. Mortality rates were 79% and 61%, respectively.

Conclusion: Airway stent insertion provides a secure and effective treatment for patients with malignant tracheobronchial fistulas.

Postentübasyon Trakeal Stenoz

Girişimsel Bronkoloji?

Cerrahi?

STENT

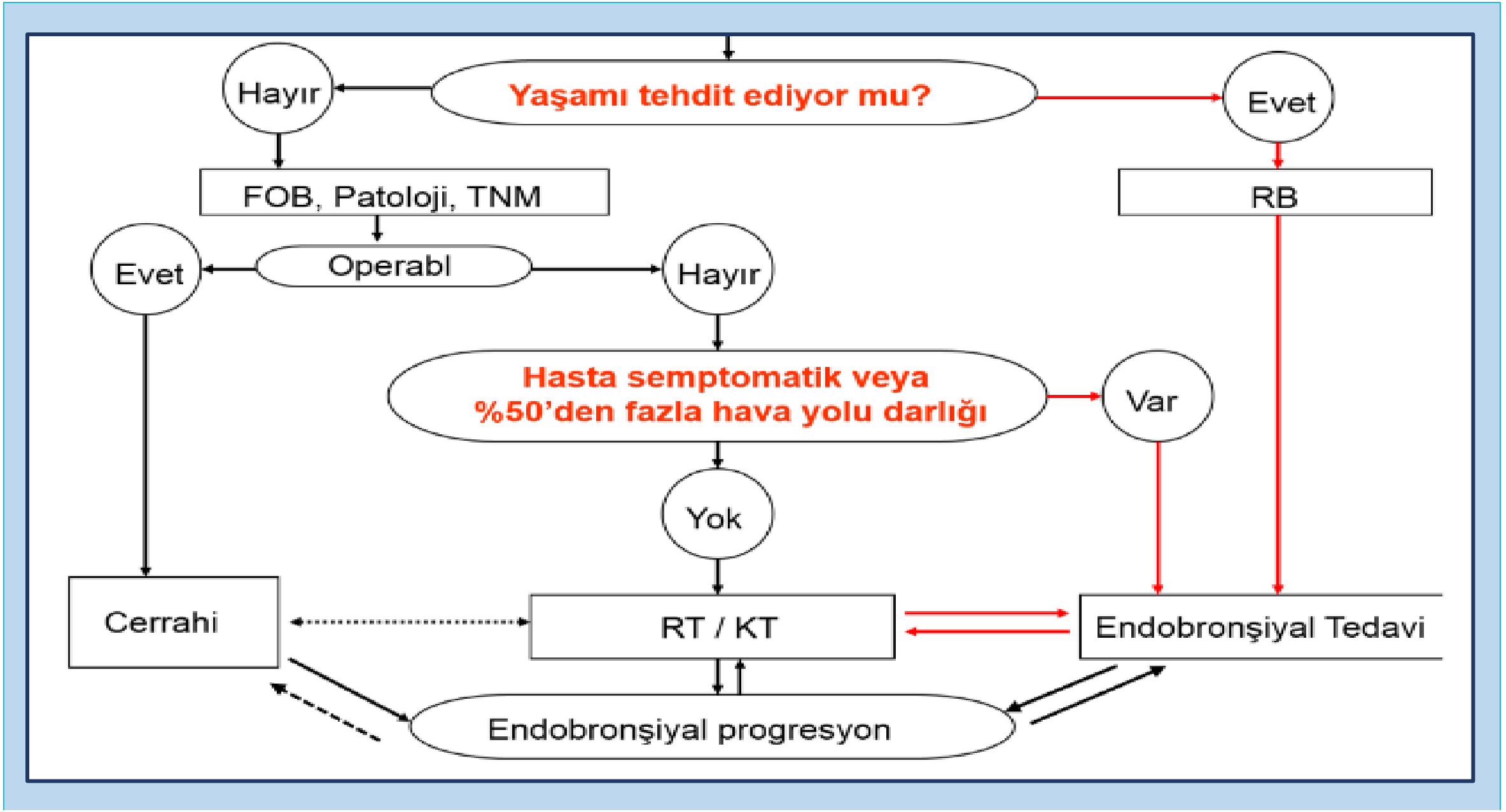
BARİYER VE DESTEK ETKİSİNDEN DOLAYI

Lümen içi tümör progresyonu engellemek

Hava yolu devamlılığını sağlamak

Zayıflamış kartılaj yapısını desteklemek

Fistüllerin iyileşmesine katkıda bulunmak



Bolliger CT, Sutedja TG, Strausz J, Freitag L. Therapeutic bronchoscopy with immediate effect: laser, electrocautery, argon plasma coagulation .Eur Respir J 2006;27:1258–1271.

TEDAVİ

- HELİOKS
- Steroid
  - Rezeksiyon yapılan hasta sayısını azaltır
  - Rezeksiyon yapılan alanı kısaltır
  - Sık bronkoskopik girişime engel olur
- Mitomycin C atuşmanı
  - DNA sentezini inhibe eden fibroblast ve kollojen depozisyonun önleyen bir antrasiklin antibiotik
  - PITS/PTTS tedavisinde etkinliği???
  - Olgu serileri sonuçları tartışmalı
  - 0,4-2.0 mg/mL konsantrasyonda
  - 1-4 prosedür, 3-8 dakika
  - Etkisi geç başlar

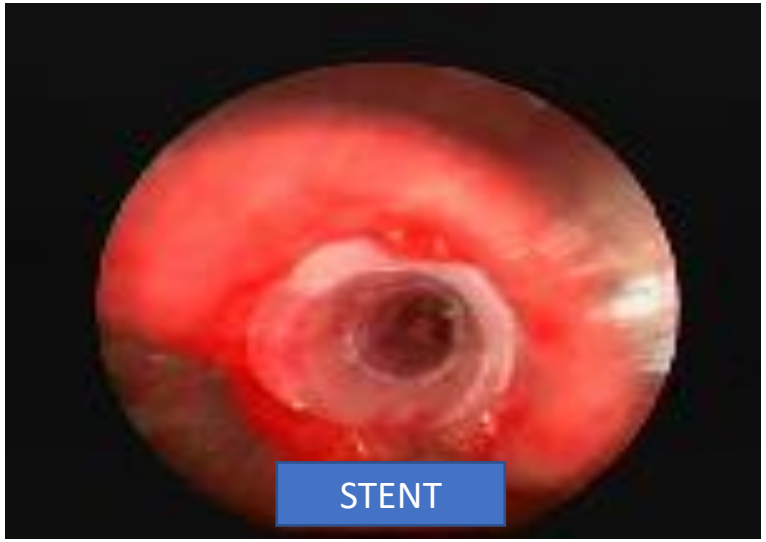
Table 6. Primary and Secondary Outcomes

Outcomes	Corticosteroid (50 Patients)	Placebo (55 Patients)	*p* Value
Days between bronchoscopies	52.3	30.6	0.115
Number of patients who finally underwent airway resection	28 (56%)	40 (72.7%)	0.102
Length of resected airway, mm	38.3	43.6	0.044

Successful treatment of tracheal stenosis by rigid bronchoscopy and topical mitomycin C: a case report: Jyi Lin Wong, Siew Teck Tie, Bohari Samril, Chee Lun Lum, Mohammad Rizal Abdul Rahman, Jamalul Azizi Abdul Rahman; Cases Journal 2010, 3:2

STENT

- İnoperabl olgularda palyasyon amaçlı
- İnoperabl olgularda küratif amaçlı
- Küratif cerrahiye kadar geçen dönemde



*Silicone stents, the rigid bronchoscope, and the standard of care in central airway

Endobronşiyal tedavi yöntemleri

STENOZ SINIFLAMASI

- Myer Cotton sınıflaması
- Mccaffrey sınıflaması
- Lano sınıflaması

- Freitag sınıflaması
- Yapısal
- Tip 1 Endolüminal kitle ve granulasyon dokusu
- Tip 2 Büyümüş lenf bezi ya da tiroid dış basısı
- Tip 3 Distorsiyon, sleeve rezeksiyon
- Tip 4 PETS gibi skar dokusunun eşlik ettiği darlık
- Dinamik ya da malazik durumlar
- Tip 1 Kıkırdak halkaları destek özelliğini kaybeder
- Tip 2 Posterior membran exp da lümene protrüze olur