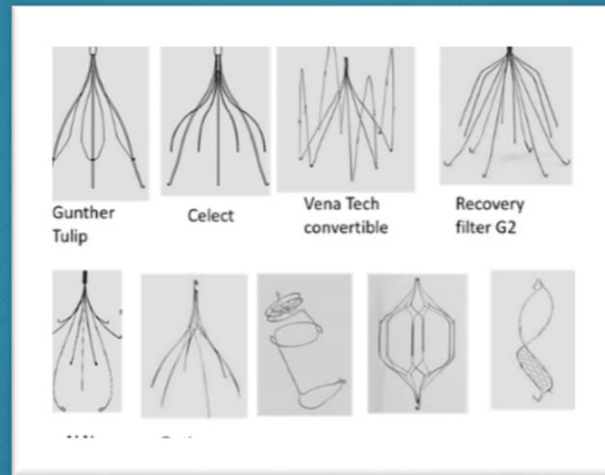


# Vena cava inferior filtre



MARIA ARVAD SERIFI

RØNTGEN OG SCANNING , SYGEHYS LILLEBÆLT , KOLDING.

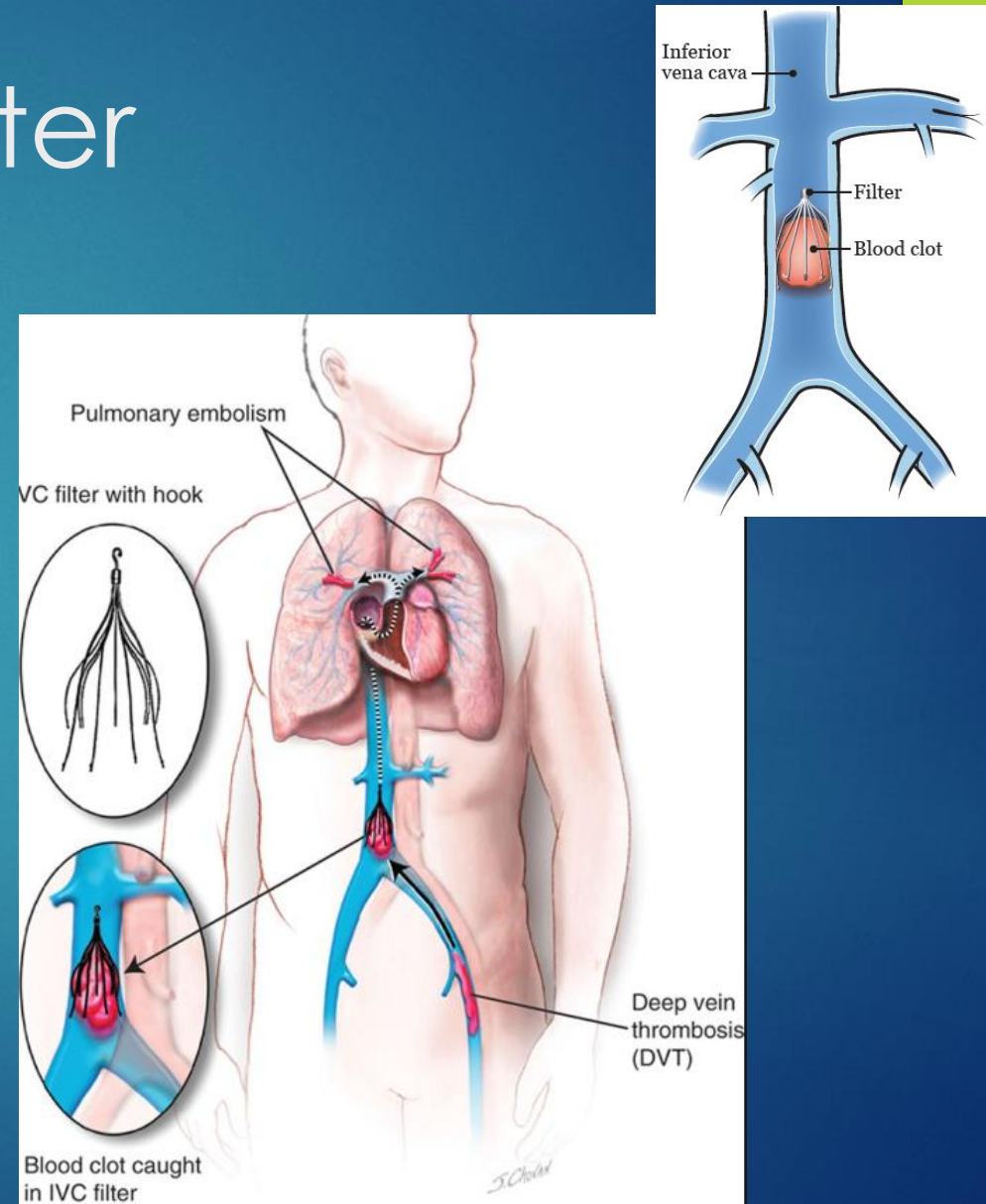


Disclosures:

▶ None

# Vena cava inferior filter

- ▶ Et lille metal device som stopper /fanger løsrene blodpropper fra DVT, således at lungeemboli forhindres.

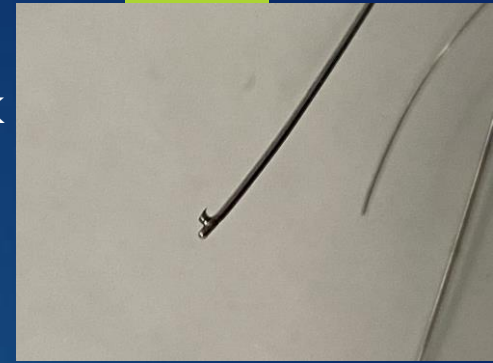


# Typer

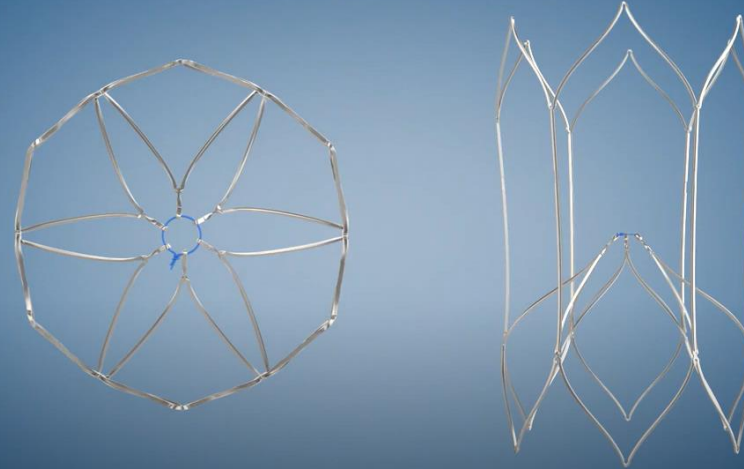
- ▶ Permanente og optional(retrivable).
- ▶ Første filter by Kazi Mobin-Uddin i 1969.
- ▶ Permante filtre har været brugt siden 1970erne til pt med behov for permanent profylakse mod LE og absolutte kontraindikationer for anticoagulation.

# Eksempler på filter typer

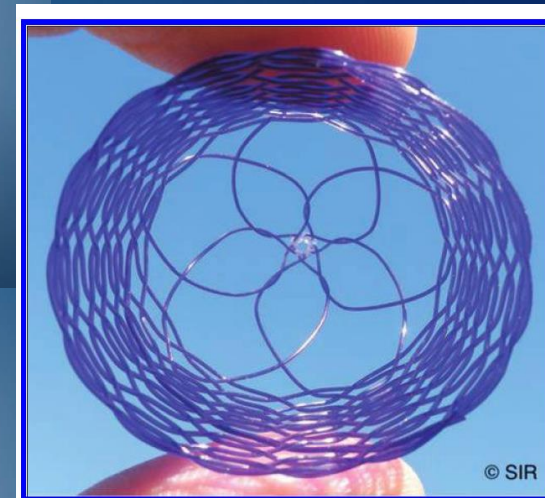
Hook



Sentry bioconvertable IVC filter



Biodegradable 6 mdr



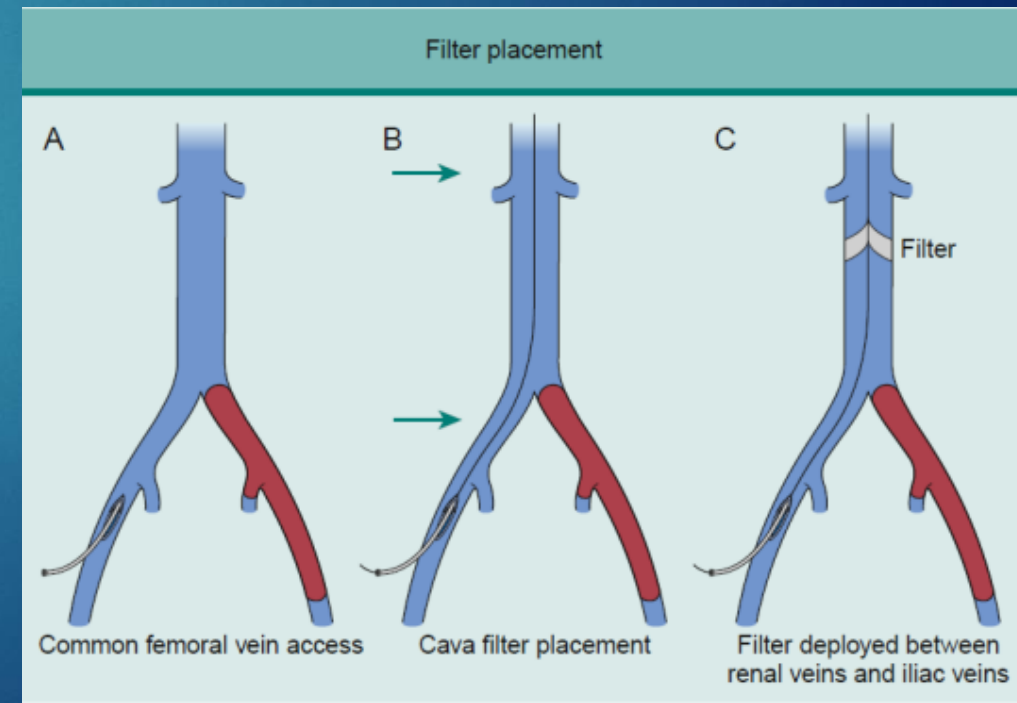
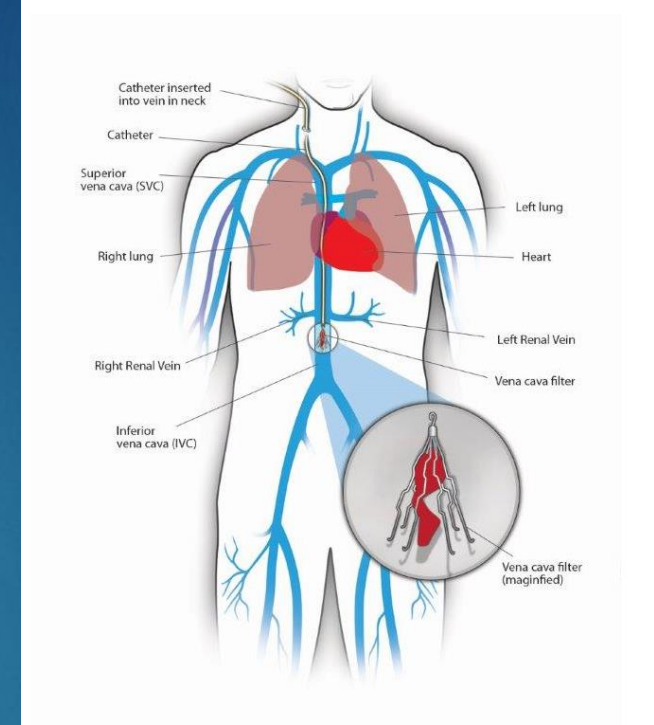
Ca 60 dage



**Fig. 1**—Photograph shows absorbable inferior vena cava filter manufactured by Adient Medical. (Reprinted from *Journal of Vascular and Interventional Radiology*, vol 31, Elizondo G, Eggers M, Falcon M, Trevino M, Marrufo R, Perez C, Nunez E, Moreno R, Mitchell A, Sheppard A, Dria S, Jay T, Kirk R, Hovsepian D, Steele J, First-in-human study with eight patients using absorbable vena cava filter for prevention of pulmonary embolism, pages 1817–1824, copyright 2020 SIR, with permission from Elsevier; [www.sciencedirect.com/journal/journal-of-vascular-and-interventional-radiology](http://www.sciencedirect.com/journal/journal-of-vascular-and-interventional-radiology))

# Indsættelse

- ▶ Under flourskopi , CO2 el GD venografi, Transabdominal UL el IVUS guided.
- ▶ 1. Punktur i V.femoralis communis eller V. jugularis, indsættelse af sheath ( typisk 7 Fr), venogram med pigtail kateter. Visualiser trombens øvre afgræsning og nyreveneindløbet.
- ▶ 2. IVC filter indsættelse i IVC over tromben ml bifurcaturen og den lavest beliggende nyrevene ( oftest hø.)
- ▶ 3. Alternativt kan suprarenal placering være nødvendig - ml vv. Renalis og levernerne)



# Indikationer:

## Metaanalyse 2017: Inferior Vena Cava Filters to Prevent Pulmonary Embolism: Systematic Review and Meta-Analysis

- ▶ **Conclusions:** Very few prospective controlled studies, with limited quality of evidence, exist regarding the efficacy and safety of IVC filters. Overall, filters appear to reduce the risk of subsequent PE, increase the risk for DVT, and have no significant effect on overall mortality.
- ▶ On the basis of the existing evidence, it would be reasonable to consider IVC filters for limited scenarios, such as **contraindication to antithrombotic therapy or recurrent PE despite adequate anticoagulation**. For the majority of remaining indications, the data are limited or conflicting.

# Indikationer:

## Metaanalyse i 2021

- ▶ Conclusions: We found insufficient evidence to conclude that the use of IVC filters can reduce **mortality**. However, the use of IVC filters decreased the new occurrence of PE without increasing deep vein thrombosis or major bleeding.

J Vasc surg Venous Lymphar Disord.2021 may;9(3)

Effect of inferior vena cava filters on pulmonary embolism-related mortality and major complications: a systematic review and meta-analysis of randomized controlled trials

Yang Liu, MM,<sup>a</sup> Huan Lu, MM,<sup>b</sup> Hualong Bai, MD,<sup>c</sup> Qi Liu, MD,<sup>b</sup> and Rongchang Chen, MD,<sup>d,e</sup> Zhengzhou, Shenzhen, and Guangzhou, People's Republic of China



# Standard of practice guideline, USA

## Guideline endorsed by **CIRSE**

- ▶ **Society of Interventional Radiology Clinical Practice Guideline for Inferior Vena Cava Filters in the Treatment of Patients with Venous Thromboembolic Disease:**
- ▶ **Developed in collaboration with the American College of Cardiology, American College of Chest Physicians, American College of Surgeons Committee on Trauma, American Heart Association, Society for Vascular Surgery, and Society for Vascular Medicine**
- ▶ The final panel consisted of 3 interventional radiologists, 2 representatives from vascular surgery, 2 representatives from vascular medicine/cardiology, 1 representative from vascular medicine, a pulmonologist, a hematologist, and a trauma/criticalcare surgeon

J Vasc Interv Radiol.2020 oct;31(10):1529-1544.

[John A Kaufman<sup>1</sup>](#), [Geoffrey D Barnes<sup>2</sup>](#), [Rabih A Chaer<sup>3</sup>](#), [Joseph Cuschieri<sup>4</sup>](#), [Robert T Eberhardt<sup>5</sup>](#), [Matthew S Johnson<sup>6</sup>](#), [William T Kuo<sup>7</sup>](#), [Susan Murin<sup>8</sup>](#), [Sheena Patel<sup>2</sup>](#), [Anita Rajasekhar<sup>10</sup>](#), [Ido Weinberg<sup>11</sup>](#), [David L Gillespie<sup>12</sup>](#)

## ABSTRACT

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**Purpose:** To provide evidence-based recommendations on the use of inferior vena cava (IVC) filters in the treatment of patients with or at substantial risk of venous thromboembolic disease.

**Materials and Methods:** A multidisciplinary expert panel developed key questions to address in the guideline, and a systematic review of the literature was conducted. Evidence was graded based on a standard methodology, which was used to inform the development of recommendations.

**Results:** The systematic review identified a total of 34 studies that provided the evidence base for the guideline. The expert panel agreed on 18 recommendations.

**Conclusions:** Although the evidence on the use of IVC filters in patients with or at risk of venous thromboembolic disease varies in strength and quality, the panel provides recommendations for the use of IVC filters in a variety of clinical scenarios. Additional research is needed to optimize care for this patient population.

However, the lack of high-quality evidence limits the strength of the recommendations

	IVC Filter	Strenght of recommendation
Acute PE + contraindications to AC	Consider	Limited ★★☆☆
Acute VTE (DVT,PE) + contraindication to AC develops	Consider	Consensus ★★★☆
VTE (DVT,PE) + completedet acute fase + contraindiacion to AC	No	Consensus ★★★☆
Recurrent VTE(DVT, PE)	No ( reason for AC failure should be addressed) Few exceptions to IVC filter	Consensus ★★★☆
Routine IVC filter placement in VTE(DVT, PE) with AC treatment	No	Moderate ★★★☆
DVT or PE with Advanced Therapies (trombolysis, trombectomy embolectomy)	Consider only in selected pt.  In the assessment of the proceduralist, selected pt at high risk of clinically significant procedure-related PE	Limited ★★☆☆
Trauma Patients without Known VTE	No	Moderate ★★★☆
Major Surgery Patients without Known VTE	No	Consensus ★★★☆



► Indwelling IVC Filters with No Anticoagulation Indication.

We cannot recommend **for or against** anticoagulation.

*Strength of Recommendation: Consensus statement* ★☆☆

► Indwelling IVC filters whose risk of PE has been mitigated or who are no longer at risk of PE,

we suggest filters be **routinely removed/converted** unless risk outweighs

*Strength of Recommendation: Consensus statement* ★☆☆☆

## ► In patients with complications associated with indwelling IVC Filters

**Remove** filter - after weighing filter- versus procedure-related risks and the likelihood that filter removal will alleviate the complications.

*Strength of Recommendation: Consensus statement* ★☆☆☆

## ► Structured Follow-up

In patients who have an IVC filter, we suggest the use of a **structured follow-up program** to increase retrieval rates and detect complications.

*Strength of Recommendation: Limited* ★★☆☆



## ► Filter Removal without Standard Snare Techniques

In patients undergoing filter retrieval/conversion whose filter **could not** be removed/converted by using standard techniques, we suggest attempted removal with **advanced techniques**, if appropriate and if the expertise is available, after reevaluation of risks and benefits.

*Strength of Recommendation: Consensus statement* ★☆☆☆

# Danske retningslinjer: ???

- ▶ **LUNGEEMBOLI**

- ▶ **Okt 2004!** Klaringsrapport fra en arbejdsgruppe nedsat af

Dansk Cardiologisk Selskab

Dansk Thoraxkirurgisk Selskab

Dansk Selskab for Trombose & Hæmostase

## LUNGEEMBOLI

*Steen Elkjær Husted  
Thomas Christiansen  
Christian Hassager  
Jann Mortensen  
Kåre Sander Jensen  
Hans Kræmmer Nielsen  
Jørn Dalsgaard Nielsen*

Klaringsrapport fra en arbejdsgruppe  
nedsat af  
Dansk Cardiologisk Selskab  
Dansk Thoraxkirurgisk Selskab  
Dansk Selskab for Trombose & Hæmostase

Tillæg til Cardiologisk Forum Oktober 2004

# Hvornår så:

<u>Routine IVC filter placement in VTE(DVT, PE) with AC treatment</u>	No	Moderate ★★☆☆
DVT or PE with <u>Advanced Therapies (trombolysis, trombectomy, embolectomy)</u>	<u>Consider only in selected pt.</u> In the assessment of the <u>proceduralist</u> , <u>selected pt</u> at high risk of clinically significant <u>procedure-related PE</u>	Limited ★★☆☆
Trauma Patients without Known VTE	No	Moderate ★★☆☆
Major Surgery Patients without Known VTE	No	Consensus ★☆☆☆

Primære indikation i Kolding:

Akut iliofemoralt DVT, hvor der påtænkes opstart af kateterbaseret trombolyse /trombectomi og hvor tromben strækker sig mere et par cm op i vena cava inferior.



# Komplikationer:

- ▶ Punktur området: blødning, trombose, infektion( 6-15%/2-35%)- dog sjældent beh. krævende
- ▶ AV-fistler- sjældne - 0.02%

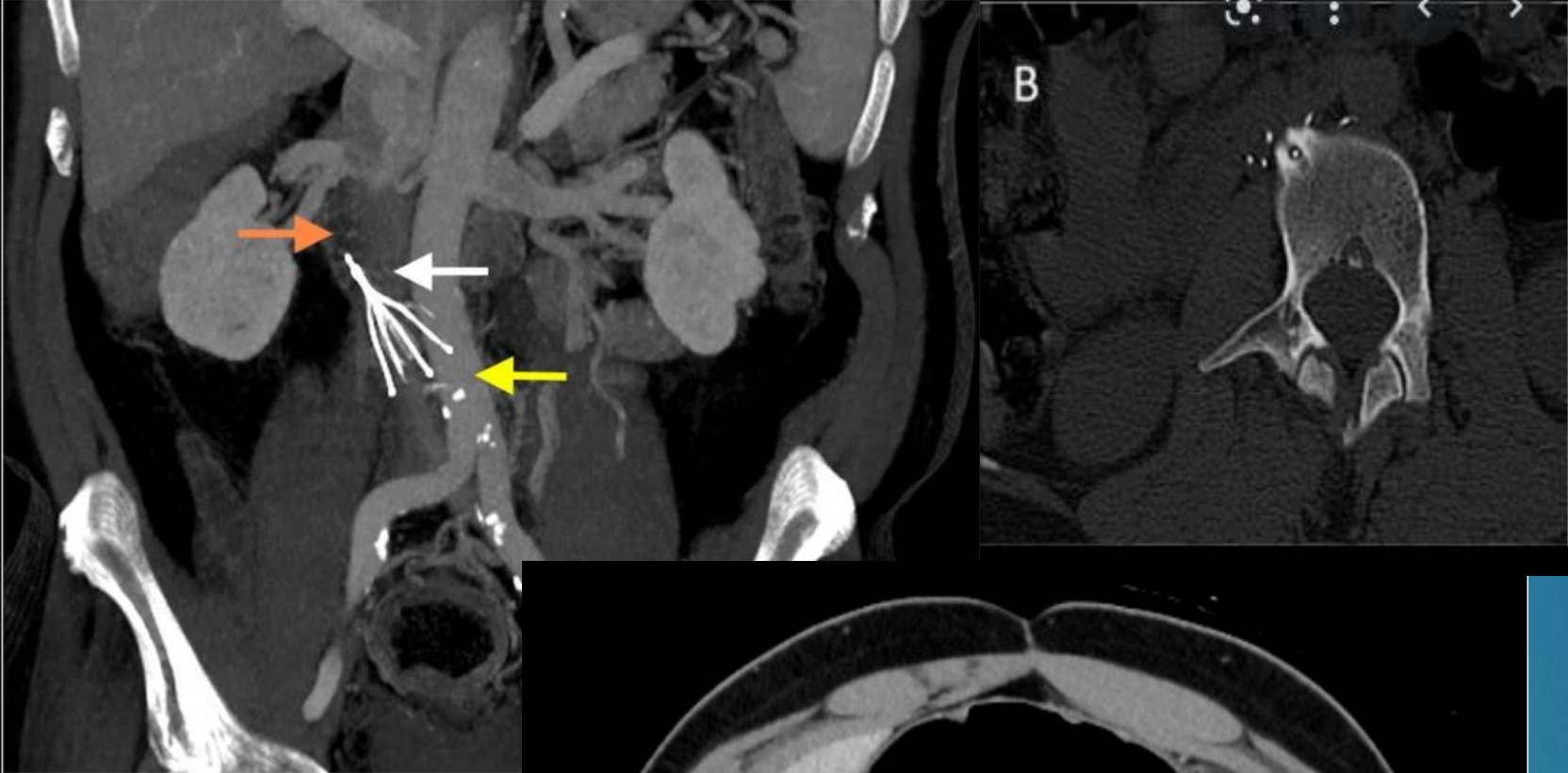
- ▶ **Filter komplikationer:**

Filter tilt – problem at fjerne filteret, øget PE risiko, øget risiko for perforation samt embedment af krog/legs



## ► Filter komplikationer:

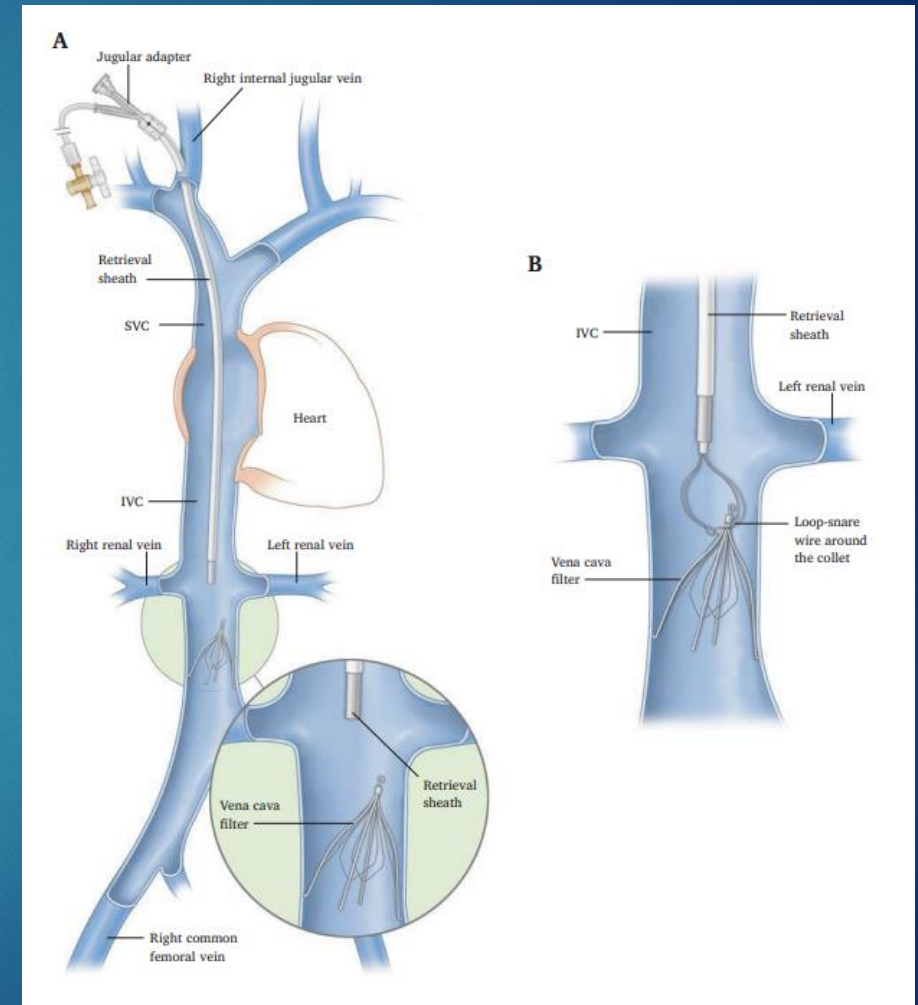
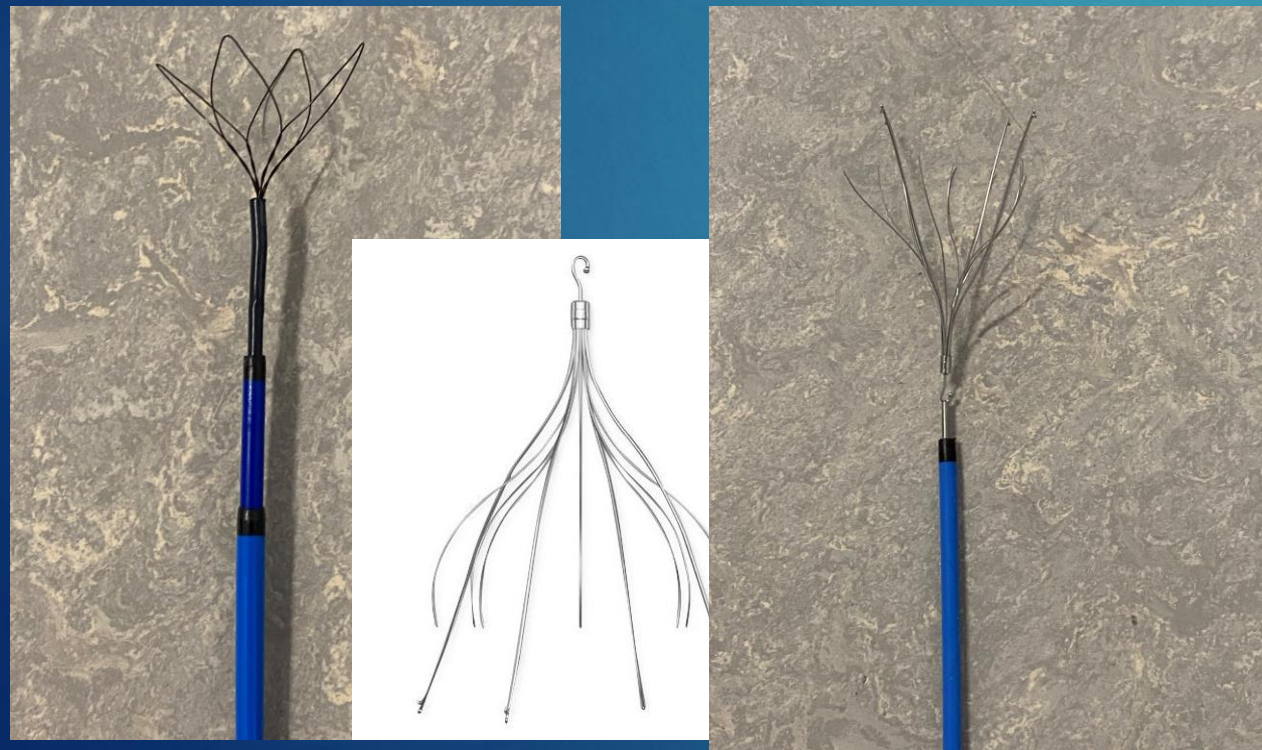
- Filter migration  $\geq 2$  cm fra initial placering. <1% incidens. Obs underdimensionering.
- Inkomplet åbning af filteret
- Filterplacering i non-target lokalisation
- Cava trombose < 10%
- Øget risiko for DVT hvis filteret forbliver der
  
- Filterfraktur og potentiel embolisering af fragment – pulmonal kar, renal vene, hjerte -ofte sen komplikation
  
- Perforation: Filter komponent penetrer > 3mm af cava væggen, ender i peri-cavale væv eller i nærliggende strukturer som duodenum, aorta, renal pelvis , retroperitoneal blødning.



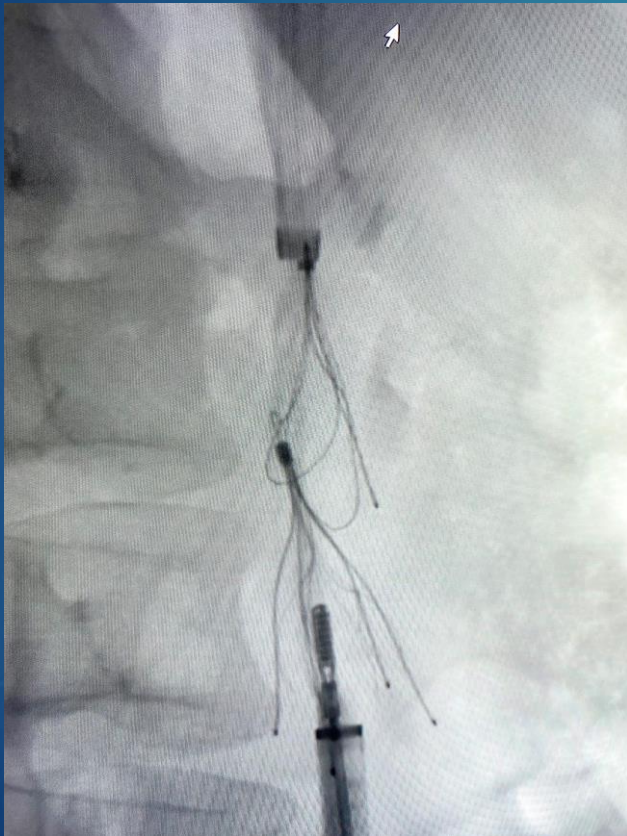
Perforation of IVC filter into duodenum. On computed tomography, the

# Fjernelse af IVC filter

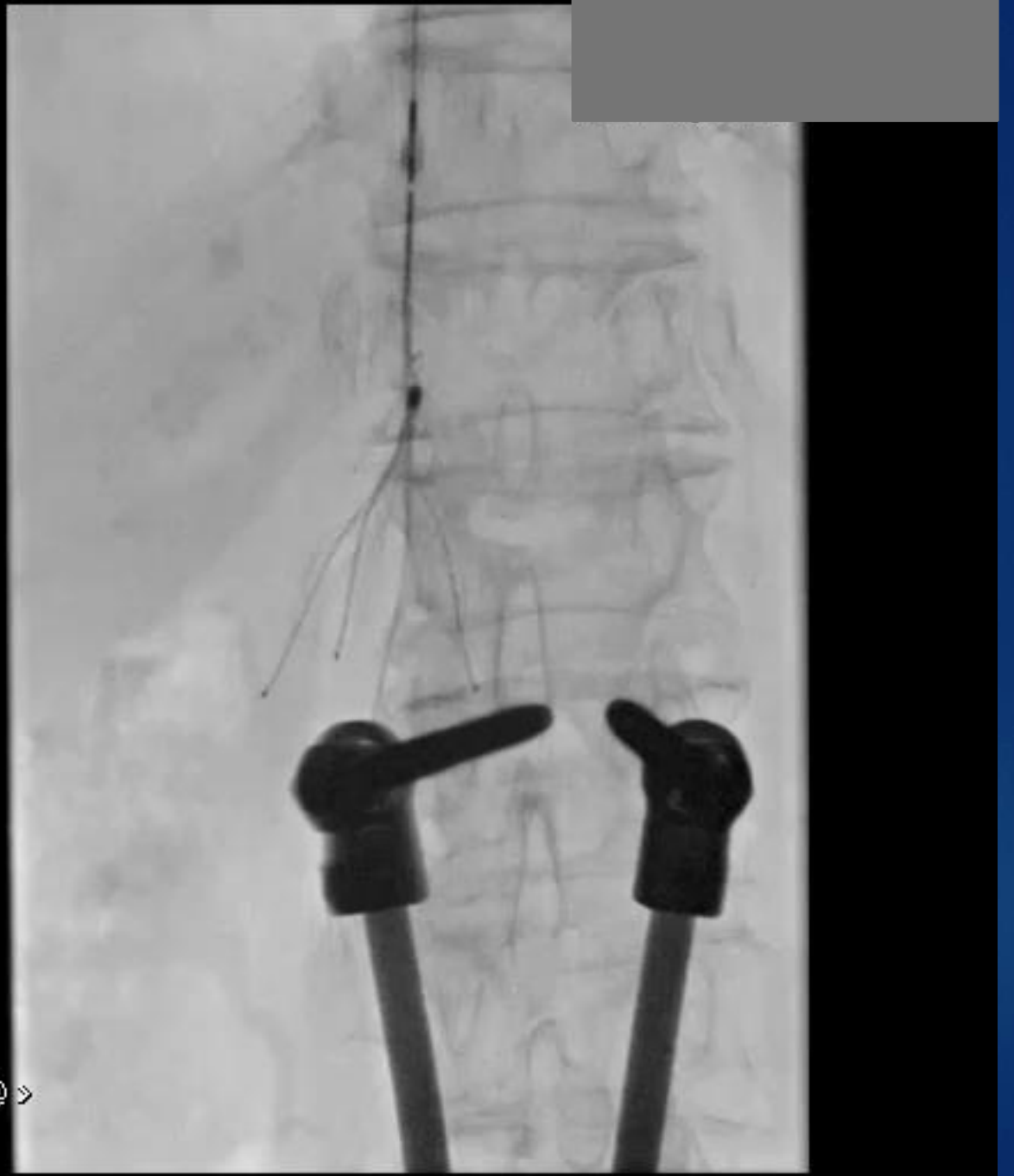
- ▶ Femoral el jugular punktur afh. af hvilken retning man har placeret krogen på filtret.
- ▶ Sheat 8-10 Fr + angulated kateter + snare af filter krogen



Case fra Kolding:  
Standard snare filter fjernelse  
efter trombolyse beh. pga  
akut iliacofemoral DVT



< 3.1 - 538 @ >



# Kompliceret fjernelse

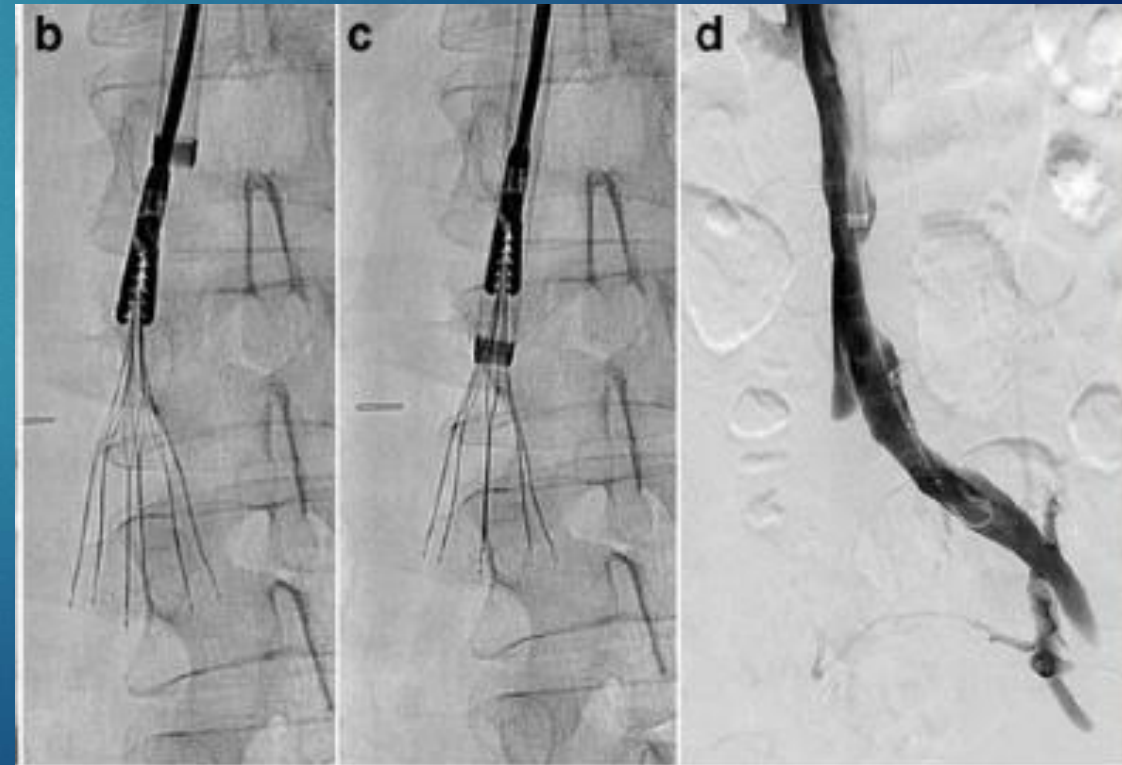
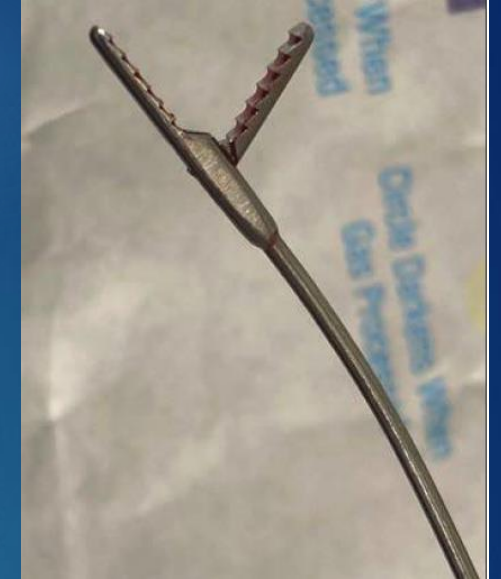
- ▶ Tiltede filter hvor krogen er i kontakt med cava væggen, Embedded filter krog /legs, filter med langvarig placering, Fragmenteret filter
- ▶ Kræver avancerede teknikker til fjernelse

# Teknikker til kompliceret fjernelse af cava filter:

- ▶ Vinklede katetre, større sheath fx 10-12 Fr, vinklet/ braided sheath.
- ▶ Endobronchial forceps teknik
- ▶ Sling teknik
- ▶ Centrerings teknik med ballon eller flossing teknik
- ▶ Endovascular laser sheath removal
- ▶ Kombinationer af ovenstående
- ▶ Anvendelse medfører alle øgning af komplikationsraten.

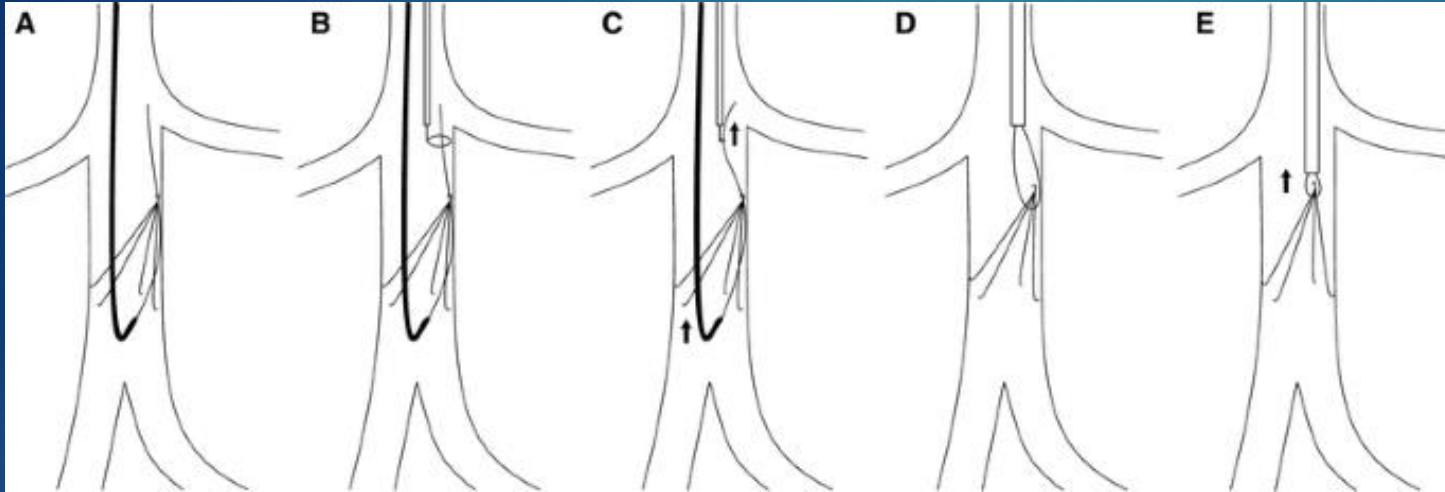
# Endobronkial Forceps teknik

- ▶ Når krogen ikke er tilgængelig med snare, oftest pga tiltet filter og embedment.
- ▶ Fridissektion af endothel cap omkring krogen med en rigid endobronkial forceps gennem endovaskulært palceret jugular sheat.
- ▶ Krogen fanges med forceps

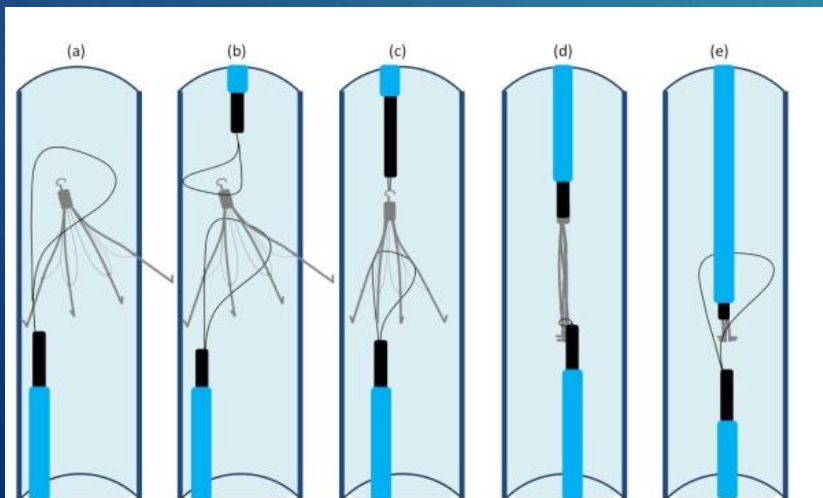




# Sling teknik

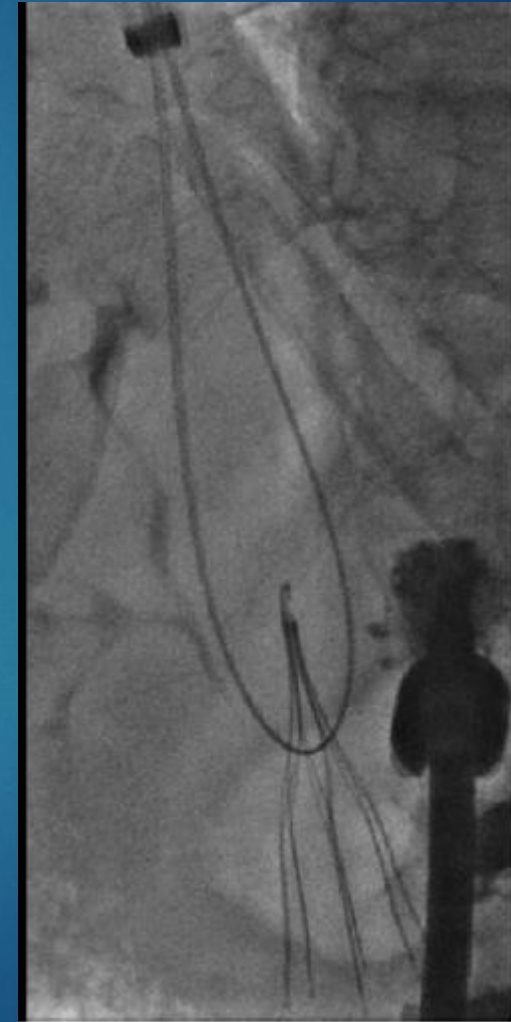


Modified bidireksional



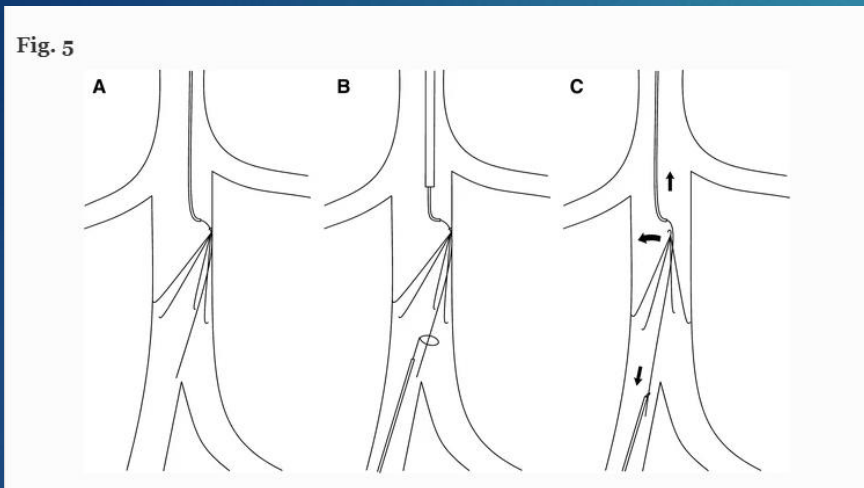
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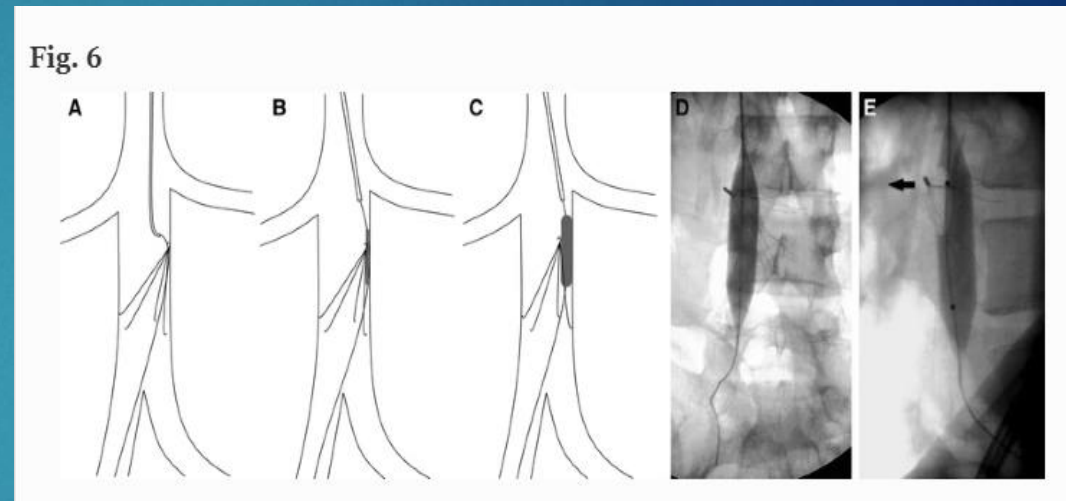


# Ballon teknik: krogen tippes fri med Wire og/el ballon

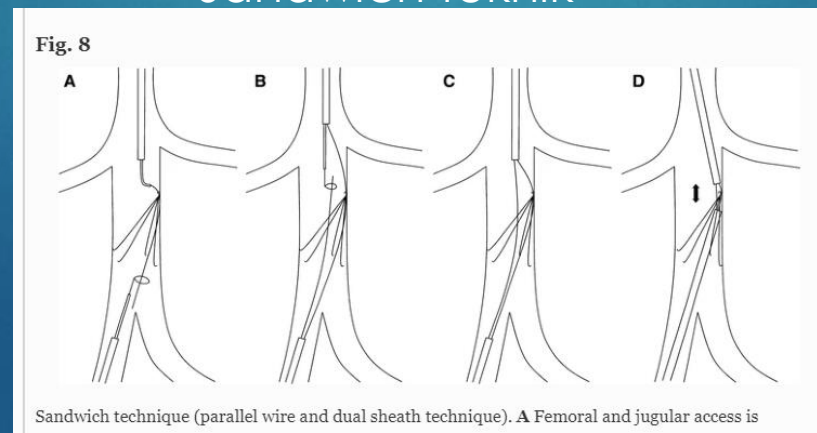
## Flossing



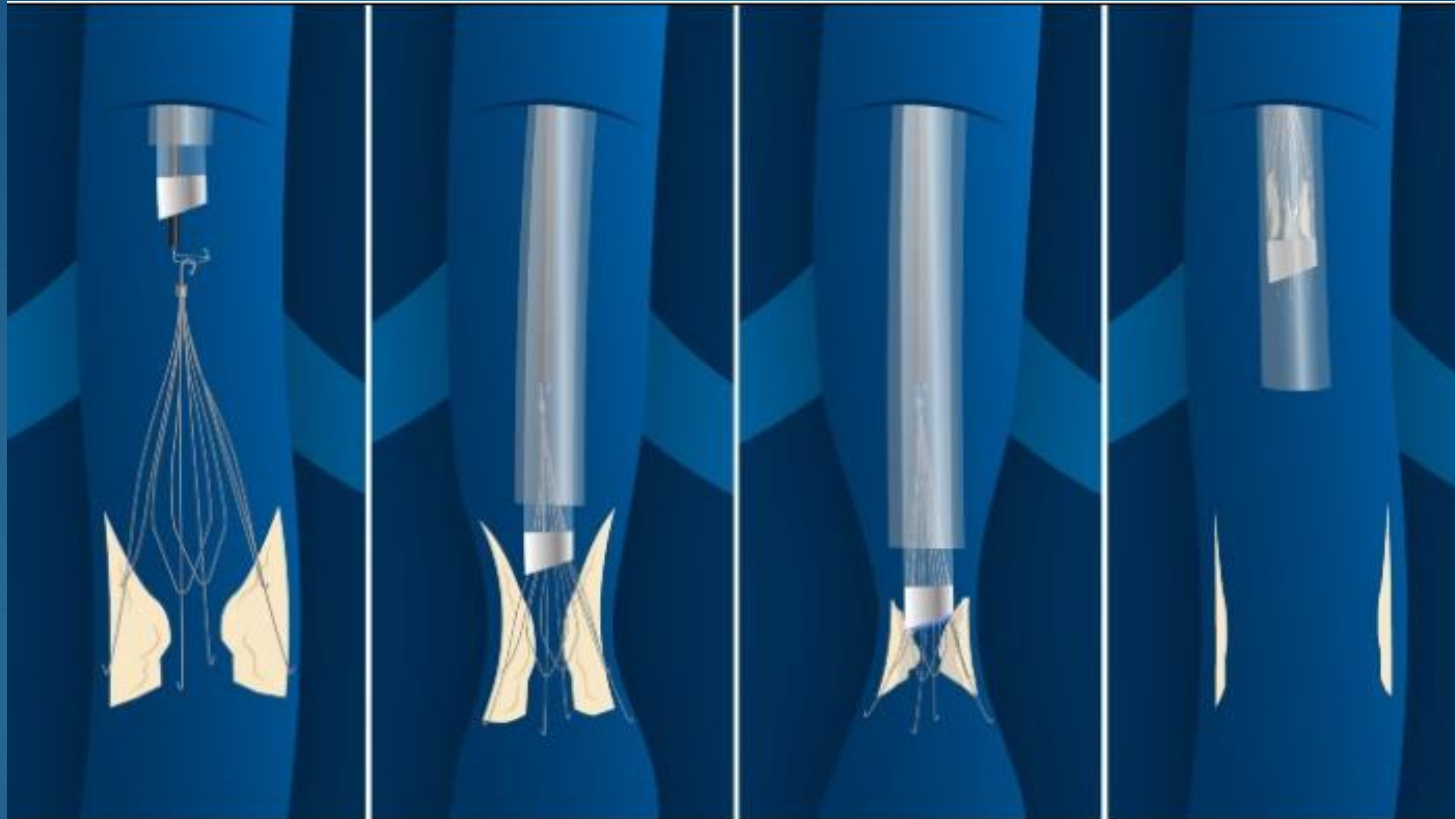
## Ballon



## Sandwich teknik



# Excimer laser

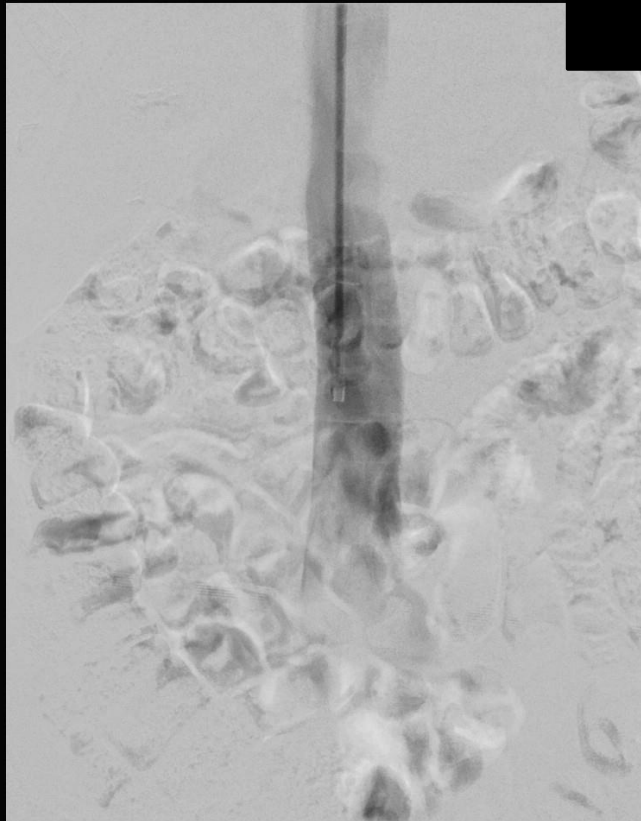
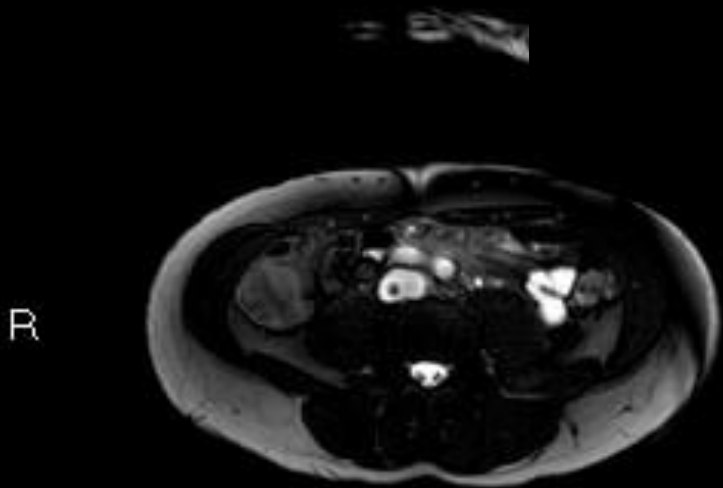


Failure rates for IVC filter removal can be high and prior to CavaClear, limited options for removal

Case fra Kolding.

Avanceret fjernelse af embedded filterkrog.

- ▶ Filter placeret i forbindelse med opstart af trombolyse for akut iliacafemoral DVT.



Efter 14 dage planlagt filter fjernelse – altid CT flebografi inden

CT før fjernelse vise betydeligt tiltet filter og formentlig embedded krog.  
Forsøges fjernet i GA x 2 uden succes pga tiltet embedded filterkrog dækket af væv. Diverse teknikker anvendt - Snare,Sling, Ballon mv.

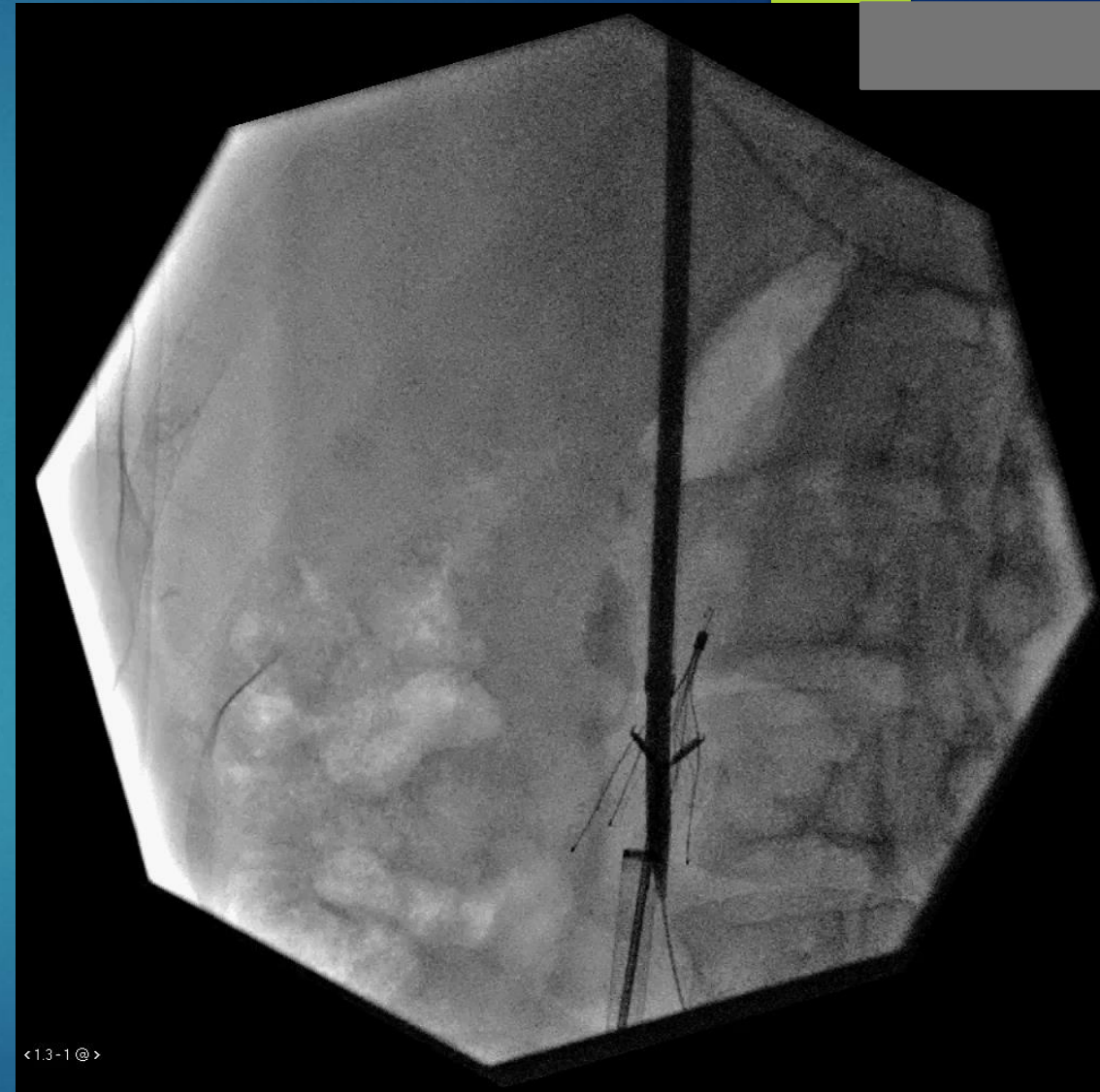


### 3. gangs forsøg på fjernelse af IVC filter i GA:

Adgang både jugular og femoral med store sheats 10Fr og 12 Fr.

Filterkrog er forsøgt fridissekeret med endodronkial forceps fra jugular sheaten først - uden held.

Forceps avanceres fra femoral sheaten til tipping af filteret og sling guidewire med ballon ind i clivagen ml filter og cava væggen



# Fjernede filter

