Bertram D. Cohn's Contributions to the Development of the Original Inferior Vena Cava Filter

Enrico Ascher, MD

Executive Co-Chairman, VEITHsymposium

- Nothing to declare. No conflict of interest.

Pulmonary Embolism in the US

- Approximately 600,000 patients annually
- Source of PE
  - Left Extremity DVT 88 % - 93 %
  - Upper Extremity DVT 7 % - 12 %
- 50,000 to 70,000 deaths/year

Hull, et al. Ann Intern Med 1983; 98: 891-899
Browse, et al. Br Med J 1974; 1: 603

Treatment of Deep Venous Thrombosis

- Pharmacologic
  - Unfractionated and low molecular weight Heparin
  - Warfarin
  - Parenteral direct thrombin inhibitors:
    - Bivalirudin
    - Argatroban
    - Desirudin
  - Oral , direct thrombin inhibitor:
    - Dabigatran
  - Oral, direct Factor Xa inhibitors:
    - Rivaroxaban; Edoxaban
    - Apixaban; Betrixaban

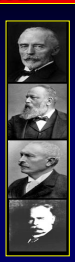
Treatment of Deep Venous Thrombosis

- Complications of anticoagulation
  - Recurrent venous thrombosis 2 - 5 %
  - Bleeding 4 - 8 %
  - Thrombus extension, HIT, others 2 - 3%

Evolution of Techniques to Obliterate the Inferior Vena Cava to Prevent PE

IVC ligation

- Kocher 1883
- Billroth 1883
- Bottini 1893
- Trendelenburg 1906

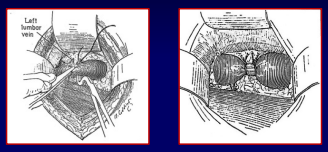


Extraluminal Interruption of the IVC

- Moretz — Smooth clip
- Spencer — Plication
- DeWeese — Mattress suture
- Miles — Serrated clip
- Abdu — Clip

Open Occlusion of the Vena Cava Into the Sixties…

A TECHNIQUE FOR LIGATION OF THE INFERIOR VENA CAVA
Retroperitonel approach; Spinal anesthesia
FJ Veith et al, Surg Gynecol Obstet, 1964 July:119:109-12

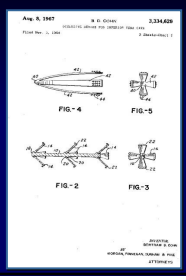


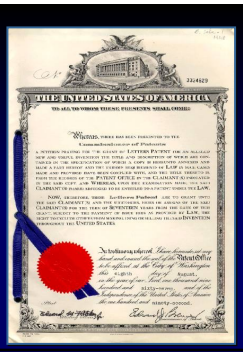
40 pts, many very sick. All survived.

First USA Patent on Intraluminal Caval Filtration

- Bertram D. Cohn, MD
- Pediatric surgeon, Brooklyn
- 1964 – 1st intraluminal caval filter
  - 3 tiered conical shape
  - 4 expanding "wings"
- First endovascular device

August 8th, 1967





1966 Abstract to the Surgical Forum

1st Permanent Endovascular Device

ENDOVASCULAR OCCLUSION OF THE VENA CAVA
by Bertram D. Cohn, M.D., F.A.C.S. 500

A method of occlusion of the inferior vena cava has been developed to allow placement of a multi-pronged spring device within the lumen of the cava under radiologic control with minimal operative risk.

The multi-pronged occlusive device of stainless steel is collapsed within a capsule of narrow diameter mounted at the end of a flexible introducer. This is passed through a saphenous or external jugular venotomy, positioning the capsule in the inferior cava. A plunger is then actuated, extruding the occlusive device within the lumen, where it automatically

American College of Surgeons

55 EAST ERIE STREET, CHICAGO, ILLINOIS 60611 — AREA CODE 312 — 664-4050 — CABLE: AMERCOLSUR

16 May 1966

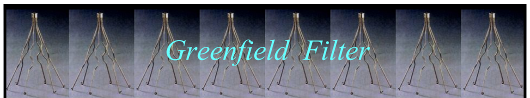
Bertram D. Cohn, M. D., F.A.C.S.
645 Ocean Avenue
Brooklyn, New York 11226

Dear Doctor Cohn:

Unfortunately, the Committee for the Forum on Fundamental Surgical Problems has not been able to fit the enclosed abstract into the Forum program for presentation at the 1966 Clinical Congress.

Sincerely yours,

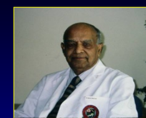
Robert J. Kamish, M. D., F.A.C.S.
Assistant Director

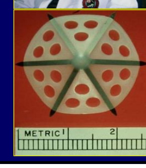


- Lazar J. Greenfield, MD,
- Introduced in 1972
- 1st device to gain wide acceptance

Mobin-Uddin Umbrella

- Kazi Mobin-Uddin (1930 - 1999)
- 1967 - 1st intraluminal caval filter
  - Silastic alloy
  - 23 mm initial diameter, 28 mm later
  - Eighteen 3 mm fenestrations
  - Jugular vein route only



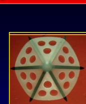


Mobin-Uddin Umbrella vs Greenfield Filter

Inferior Vena Occlusion

Mobin-Uddin → 73%

Greenfield Filter → 5%



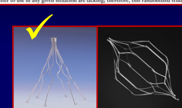
J Thorac Cardiovasc Surg 79:358-365, 1980
GE Cimochowski et al

Prospective randomized study comparing the clinical outcomes between inferior vena cava Greenfield and TrapEase filters

Fred Usoh, MD, Anil Hingorani, MD, Enrico Ascher, MD, Alexander Shiferson, MD, Nirav Patel, DO, Kapil Gopal, MD, Natalia Marks, MD, RVT, and Theresa Jacob, PhD, *Brooklyn, NY*

Objective: Although anticoagulation remains the mainstay of treatment for deep venous thrombosis, the use of inferior vena cava (IVC) filters when anticoagulation has failed or when contraindicated remains a safe and effective treatment. Greenfield (Boston Scientific, Natick, Mass) and TrapEase (Cordis, Bridgewater, NJ) filters are arguably among the most popular filtration devices. The Greenfield filter (12F introducer) has been in use for >30 years and has been well studied. The TrapEase filter (6F introducer) has been used since 2000, with a limited number of studies. Good guidelines to help determine which filter to use in any given situation are lacking; therefore, this randomized study prospectively compared

JVS



The only prospective randomized study dealing with IVC filters

THE VASCULAR INSTITUTE OF NEW YORK®

IVC Partial Thrombosis

IVC Thrombosis

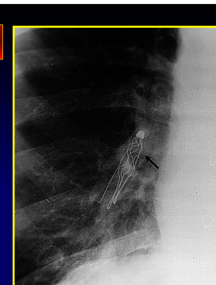
Filter Migration to the Heart

Intracardiac and intrapulmonary Greenfield filters: A long-term follow-up

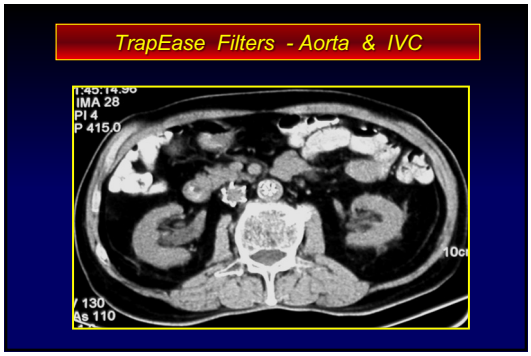
Gary A. Gelbfish, MD, and Enrico Ascer, MD, *Brooklyn, N.Y.*

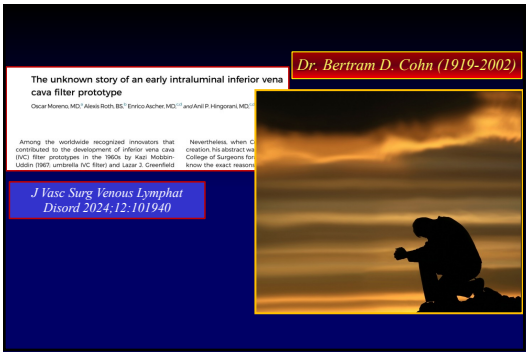
The Greenfield vena caval filter has become the preferred method of vena caval filtration. Its high long-term patency rate and low complication rate make it ideal for those patients in whom anticoagulation has failed or is contraindicated. A known complication of filter insertion is the inadvertent placement or migration of the filter to the right side of the heart. We present three cases from our institution where the Greenfield filter was inadvertently ejected into the right atrium. An attempt at removal with a wire loop and sheath in two cases failed and resulted in the migration of one filter to the right inferior pulmonary artery. We found no evidence of long-term complications at 2, 45, and 60 months. We conclude that conservative management may be considered in these cases. (J Vasc Surg 1991;14:614-7.)

3 Cases
2 months, 45 months & 5 years
All asymptomatic!



Migration of an inferior vena cava filter into the pulmonary artery


TrapEase Filters - Aorta & IVC
IMA 28
PI 4
P 415.0


Dr. Bertram D. Cohn (1919-2002)
The unknown story of an early intraluminal inferior vena cava filter prototype
J Vasc Surg Venous Lymphat Disord 2024;12:101940