Interventional Radiology and Trauma

Austin Trauma and Critical Care Conference 2016

Stephen Pan, MD
Vena Caval Interruption and Trauma
Vena Caval Interruption and Trauma

INDICATIONS

LIABILITY

COMPLICATIONS

RETRIEVAL

ADVANCED TECHNIQUES
INDICATIONS

Prophylactic (No Current Thromboembolic Disease)
1. Severe trauma without documented PE or DVT.
   a. Closed head injury.
   b. Spinal cord injury.
   c. Multiple long bone or pelvic fractures.
2. High-risk patients (e.g., immobilized or in an ICU)
For major trauma patients, we suggest that an IVC filter should not be used for primary VTE prevention.

In patients undergoing major orthopedic surgery, we suggest against using IVC filter placement for primary prevention over no thromboprophylaxis.
Grade 2C recommendation = Very weak recommendation. Other alternatives may be equally reasonable.

Low-quality or very low-quality evidence.
Why Did Firm Keep Selling Problem Blood-Clot Filters?

by TIM SANDLER and STEPHANIE GOSK
A total of 63 fractured Recovery, G2, and G2 Express IVC filters were identified among 548 patients presenting for filter removal between April 2004 and November 2010.

Overall fracture rate 12%.
Success rates for removal of the nonfractured component (main body) and fractured components (arm or leg) were 98.4% and 53.4%, respectively.

IVC filter fracture rates increase with longer dwell times.
Denali®
Vena Cava Filter

BARD Peripheral Vascular
Penetration of Celect Inferior Vena Cava Filters: Retrospective Review of CT Scans in 265 Patients

Dayong Zhou¹,²
Eunice Moon¹
Jennifer Bullen³
Mark Sands¹
Abraham Levitin¹
Weiping Wang¹

AJR 2014; 202:643–647
Penetration of primary leg was observed in 39% of patients within 30 days and 80% of patients within 90 days after placement.

Penetration into adjacent organs occurred in 35 of 265 patients:
- Duodenum 22
- Aorta 9
- Psoas muscle 4
- Vertebral body 3
- Pancreas 2
LESS IS MORE

Indications, Complications, and Management of Inferior Vena Cava Filters

The Experience in 952 Patients at an Academic Hospital With a Level I Trauma Center

Shayna Sarosiek, MD; Mark Crowther, MD; J. Mark Sloan, MD

During the period of this medical record review, no standardized procedure was in place to track patients or facilitate retrieval.
Complications -

- Pulmonary emboli
- Migration
- Perforation
- Fracture
A filter insertion procedure note that specifies the indications for filter placement and the anticipated duration of placement is now mandatory for all IVC filter insertions.

Every IVC filter is promptly entered into a central interdepartmental registry and tracked until retrieval.
67 year old male with a Celect IVC filter placed at an outside hospital in 2011.

Patient presents in February 2016 with abdominal pain and GI bleed.

CTA of the abdomen and pelvis with a GI bleed protocol is performed.
Advanced Techniques for IVC Filter Removal

The Excimer Laser Sheath Technique for Embedded Inferior Vena Cava Filter Removal

William T. Kuo, MD, and John S. Cupp, MD

Figure 1. (a) The 12-F laser-tipped sheath and (b) the CVX-300 excimer XeCl laser system.
Over 12 months, 25 consecutive patients underwent attempted IVC filter retrieval with a laser-assisted sheath technique.

Laser-assisted retrieval was successful in 24 of the 25 patients.
Splenic Embolization and Trauma
Splenic Embolization and Trauma

The objective of splenic artery embolization in blunt splenic injury is to improve the results of nonoperative management.
Splenic Artery
Splenic Artery
### Spleen injury scale (1994 revision)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Injury type</th>
<th>Description of injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Hematoma</td>
<td>Subcapsular, &lt;10% surface area</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>Capsular tear, &lt;1cm parenchymal depth</td>
</tr>
<tr>
<td>II</td>
<td>Hematoma</td>
<td>Subcapsular, 10%-50% surface area; intraparenchymal, &lt;5 cm in diameter</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>Capsular tear, 1-3cm parenchymal depth that does not involve a trabecular vessel</td>
</tr>
<tr>
<td>III</td>
<td>Hematoma</td>
<td>Subcapsular, &gt;50% surface area or expanding; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma ≥ 5 cm or expanding</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>&gt;3 cm parenchymal depth or involving trabecular vessels</td>
</tr>
<tr>
<td>IV</td>
<td>Laceration</td>
<td>Laceration involving segmental or hilar vessels producing major devascularization (&gt;25% of spleen)</td>
</tr>
<tr>
<td>V</td>
<td>Laceration</td>
<td>Completely shattered spleen</td>
</tr>
<tr>
<td></td>
<td>Vascular</td>
<td>Hilar vascular injury with devascularizes spleen</td>
</tr>
</tbody>
</table>

*Advance one grade for multiple injuries up to grade III.
Wake Forest University, Level I trauma center

Prospective study

Protocol requiring splenic angiography and embolization in all stable patients presenting with grades III to V blunt splenic injuries and/or contrast blush on CT
Historic controls (1/1/2007 to 12/31/2009)
153 patients with grade III to V injuries
80 (52%) patients underwent attempted NOM
Failure rate (15%)

Protocol (1/1/2010 to 12/31/2012)
168 patients with grade III to V injuries
113 (67%) patients underwent attempted NOM
Failure rate (5%, p=0.04)
Protocol -
Required embolizations of all patients undergoing angiography.

Protocol-violation group had a significantly higher failure rate (25%, p=0.02) than the protocol group.
Other prospective trials demonstrate that nonoperative management success in higher-grade (III to V) injuries can be as high as 95% when angioembolization is applied in a protocolized fashion.

Eleven Level I trauma centers

Patients admitted with a blunt splenic injury managed for 24 hours without splenectomy.
Grades III to V, 180-day risk of splenectomy

<table>
<thead>
<tr>
<th>TABLE 2.</th>
<th>Risk of Splenectomy With and Without ANGIO With EMBO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No ANGIO and EMBO (n = 102)</td>
</tr>
<tr>
<td>Splenectomy</td>
<td>6.9%</td>
</tr>
</tbody>
</table>
Patients with Grade III to V injury may benefit from angiography, but the effect may be small.

A randomized study would need at least 450 patients per group (embolization versus watchful waiting) to detect a statistical difference.
For Grade II to V blunt splenic injury, observation (hospital or outpatient) is indicated for 10 to 14 days because this is the time of greatest risk of splenectomy.
35 year old male unrestrained driver involved in a motor vehicle crash in May 2009.

CT chest, abdomen and pelvis is performed.
Grade III splenic injury.

Multiple anterior left rib fractures. Left clavicular fracture.

Discharged 6 days after admission.
Presented 4 years and 2 months later with chest pressure, dyspnea, and nausea.

CTA chest obtained in the ER.
CT abdomen and pelvis obtained the next morning.
Discharged 4 days after admission.
THANK YOU!

Austin Trauma and Critical Care Conference
2016

Stephen Pan, MD