Original Article

Inferior Vena Cava Filters in High-Risk Patients: Indications and Outcomes with Emphasis on Trauma Cases

Osamah Obaid Ibrahim

ABSTRACT

Objective: To evaluate the safety and efficacy of inferior vena cava filter.
Study Design: Retrospective study
Place and Duration of Study: This study was conducted at the Nasiriyah Teaching Hospital in Dhi Qar Governorate from 15th February 2025 to 30th September 2025.
Methods: This study involved 20 patients with inferior vena cava filters. The data was obtained age, gender, morbidities and signs of filter placement.
Results: There were 12 (60%) males and 8 (40%) females with male to female ratio 1.5:1 and 8 (40%) patients were between 39-50 years old. Eleven (55%) of patients were trauma with high risk of venous thromboembolism, 4 (20%) patients non-traumatic with high risk of recurrent pulmonary embolism, 3 (15%) of patients with poorly responded to anticoagulant therapy and only 2 (10%) of patients were contraindicated to anticoagulant. Eleven (55%) of patients had filter inserted via femoral vein access, 7 (35%) of them with jugular access, and 2 (10%) patients with subclavian vein access.
Conclusion: All accesses of inferior vena cava filter are feasible but still jugular or subclavian route are superior on femoral access especially in cases of bilateral lower limbs deep vein thrombosis. Most of the patients that required inferior vena cava filter were high risk of venous thromboembolism patients who were trauma patients.

Key Words: Inferior vena cava filters, Deep vein thrombosis, Pulmonary embolism, Venous thromboembolism, Interventional radiology, Trauma, Anticoagulation

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INTRODUCTION

Thromboembolic disease is also one of the major causes of morbidity and mortality. A filter placed in the inferior vena cava (IVC) is one of the strategies that can be used to prevent the severe pulmonary embolism (PE) caused by deep vein thrombosis (DVT). Nowadays, this is usually done with radiologic guidance through the femoral or jugular venous access[1] and it may be safely performed in office practices in patients with low to moderate procedural risk.[2,3] This paper focuses on our experience with the use of IVC filters. The absolute reasons of the placement of IVC filters entail the presence of DVT or PE in patients who are unable to take anticoagulants, patients who develop PE despite anticoagulant use, or patients who get complications associated with taking anticoagulants.

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Nonetheless, a meta-analysis study by Jiang et al[4] and found no significant difference at 3 months of anticoagulation between the addition of IVC filter to anticoagulation and anticoagulation alone. Relative indications are free-floating thrombus in the IVC or iliofemoral veins, PE in patients with limited cardiopulmonary reserve, prophylaxis in high-risk populations (i.e., major trauma, spinal cord injury, or paraplegia), preoperative protection in patients with DVT, non-compliance with anticoagulation, and use during thrombolytic therapy. There is limited evidence on the use of prophylaxis in cancer patients but a study by Balabhadra indicated better PE-free survival among cancer patients with DVT and high risk of bleeding after IVC filter placement. The contraindications are absolute (impossibility to reach the IVC) and relative (coagulopathy, complete IVC thrombosis, bacteremia or sepsis, a caval diameter smaller than 15 mm).[5] Neurocritical Care Society discourages a common practice of using IVC filters as first-line prophylaxis against VTE in patients with external ventricular drains.[6] In the same manner, the American College of Chest Physicians does not favor the use of filters in patients with acute DVT or PE who is properly anticoagulated.[7] Inferior vena cava filters are generally divided into permanent (non-retrievable) and temporary (retrievable) ones. Permanent filters cannot be reused or taken off but retrievable filters can be moved or taken

off within a specific period of time. With time, filters can be entrenched into the caval wall making it hard to recover them. In 2014, the US Food and Drug Administration published a safety communication where issues with low retrieval of temporary filters were raised and it was advised to remove them once they no longer protect against PE, and after a thorough risk-benefit evaluation.[8]

Nonetheless, the retrieval rates are still suboptimal and methods of enhancing them are under development.[16] Also, the installing IVC filters has been linked to the enhanced likelihood of malpractice lawsuits.[9] In terms of insertion methods, IVC filters come in different designs and can be inserted by using jugular or femoral access. Iliofemoral thrombosis would favor the jugular route. Other filters cannot be implanted through the left jugular vein because of rigidity of the device. The majority of filters can be used with IVC diameters below 3 cm, whereas bigger filters (megacava) might need special ones.[10]

The placement is usually determined using fluoroscopy or ultrasound, but computed tomography (CT) guidance could be beneficial in some instances, including morbid obesity.[11] Prophylaxis IVC filter placement in bariatric surgery patients with high risk of VTE has been linked to low DVT and PE postoperative rates (3 and 1, respectively), and no life threatening PE was reported. The success rates of retrieval were high, and the complications were low. Prophylactic filter placement has been shown to be associated with an increased incidence of DVT and nonfatal PE, and increased ICU stay, but not with regard to in-hospital mortality in patients with severely injured trauma. Prophylactic IVC filters could save lives in patients with severe head injuries, but not in patients with less severe head injuries.[12] The tools needed to put the IVC filters are ultrasound with a linear probe, fluoroscopy, antiseptic (chlorhexidine or povidone-iodine) and heparinized saline.[13] The use of local anesthesia is usually done to about 5 mL of 1% lidocaine and sedation is not mandatory but varies according to the practice of the patients and the institutions.[14] The patients lie on their backs and in order to access the jugular, the head can be turned opposite to the side of access.[15]

Venous puncture is done under ultrasound guidance and the access site is sterilized. With a small skin incision, a micropuncture or 18-gauge needle is used to reach the vein. Placement of guide wires is fluoroscopically verified and a sheath and catheter are then inserted. Venography is done to assess the IVC patency, size, placement of the renal vein and anatomical anomalies.[16] When satisfactory results are achieved, the sheath of the introducer is inserted and the filter is delivered beneath the renal veins as directed by the manufacturer. Depending on the need, the filter can be repositioned prior to final discharge. This is followed by completion cavography to ensure that they are correctly placed.[17,18] Other precautions are not to manipulate catheters via thrombus to avoid embolization and to make sure that there is correct imaging during the procedure. Suprarenal filters can be an option in IVC thrombosis. The majority of IVC filters can be used with MRI up to 3 Tesla, and imaging in the future will not be limited.[19-21]

METHODS

This retrospective study was conducted at Nasiriyah Teaching Hospital in Dhi Qar Governorate from 15th February 2025 to 30th September 2025 vide letter No. 33434/QM/Approval/dvdvdv dated February 7, 2025 and involved 20 patients with inferior vena cava filters. The selection of patients to be placed on IVC filters was done through physician or surgeon referrals in various specialties. Informed consent was taken and renal functioning was checked before the procedure. Every procedure made use of Denali™ Vena Cava Filter (Bard Peripheral Vascular, Inc) jugular, subclavian, or femoral delivery kits. The use of standard sterile methods with chlorhexidine or povidone-iodine solution, as well as 2% lidocaine as a local anesthetic, was used. Doppler-guided venous access was done through a 19-gauge needle via the right internal jugular, or subclavian or femoral vein. The 0.035- or 0.038-inch guide-wire was inserted with the fluoroscopic guidance into the IVC, and the filter sheath was inserted. To identify the best place of deployment, a venogram was done. The filter was then installed as per the instructions of the manufacturer and a confirmatory venogram was done. Lastly, the delivery system was discontinued and hemostasis was done by hand. The operations were done in an operating theatre or a catheterization laboratory. The data was analyzed through SPSS-25.

RESULTS

The average was 54.5 years and 12 (60%) males and 8 (40%) females with male: female ratio 1.5:1 (Fig. 1). Indications for placement of filters were trauma patient with high risk of VTE in 11 (55%) patients, massive PE with residual DVT in 4 (20%) patients, propagation and/or progression of DVT during therapeutic anticoagulation in 3 (15%) patients and contraindication to anticoagulation in 2 (10%) [Table 1].

Table No. 1: Indications for IVC filter placement

Indication	No.	%
Trauma patient with high risk of VTE	11	55.0
Massive PE with residual DVT in a patient at risk for further PE	4	20.0
Propagation and/or progression of DVT during therapeutic anticoagulation	3	15.0
Contraindication to anticoagulation	2	10.0

The site of insertion was femoral vein in 11 patients 55%, jugular vein in 7 patients 35% and subclavian vein in 2 patients 10%. There were no complications related to the placement of the IVC filter (Table 2).

Table No. 2: site of venous access of IVC filter

Venous access	No.	%
Femoral vein	11	55.0
Jugular vein	7	35.0
Subclavian vein	2	10.0

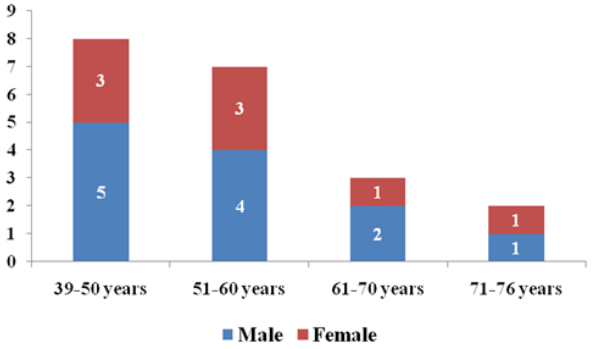

Figure No. 1: Gender distribution according to age

DISCUSSION

The installation of IVC filters and their recall have been increasing within the FDA accreditation period of 2010 onwards. However, there is yet to be little evidence to support its use. The rate at which patients are getting the IVC filter is on the rise.[22] In the present study, mean age was 54.5 year olds with most of them being of middle age and above. This may be as a result of high incidence of accidents and comorbidities. The male patients were more than female patients. The most common indication to place IVC filter was trauma patient at high risk of VTE (55%), comparable to Kaufman et al[23], where prophylactic indication was used to place all the filters and over a half of all indications. One out of ten of our patients were contraindicated to anticoagulation (acute hemorrhagic stroke). Regarding the site of the selected venous access, most of our patients had the femoral vein access because of unilateral DVT, patients with bilateral extensive DVT, the IVC filters were implanted using the jugular vein access in 7 patients, and patients with the jugular vein thrombosis and inaccessible access had the subclavian vein access. This finding similar to Kalva et al[24], the most frequent site of insertion was in the femur. In our study, there were no complications with the insertion of the IVC filter as compared to Nazzal et al[25] who had complications (access site hematoma, ipsilateral DVT, migration, pulmonary embolism) with varying percentage.

CONCLUSION

All access routes to the inferior vena cava filters are possible, but the jugular access or subclavian access is better than the femoral access, especially when there is bilateral lower limb deep vein thrombosis. Majority of patients requiring to be put on inferior vena cava filters are high-risk trauma patients who are likely to develop venous thromboembolism. Overall, inferior vena cava filter insertion is a non-invasive procedure, and it could be performed in the operating room, and not limited to the catheterization lab under fluoroscopy.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Osamah Obaid Ibrahim
Drafting or Revising Critically:	Osamah Obaid Ibrahim
Final Approval of version:	The above author
Agreement to accountable for all aspects of work:	The above author

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