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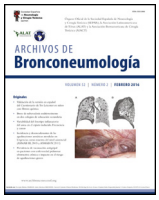

Original Article

Success in Optional Vena Cava Filter Retrieval. An Analysis of 246 Patients☆

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ABSTRACT

Objective: This study assessed vena cava filter (VCF) retrieval rates and factors associated with retrieval failure in a single center cohort.
Methods: We conducted an observational retrospective cohort study. The primary endpoint was the percentage of patients whose VCF was retrieved. We performed logistic regression to identify variables associated with retrieval failure.
Results: During the study period, 246 patients received a VCF and met the eligibility requirements to be included in the study; 151 (61%) patients received a VCF due to contraindication to anticoagulation, 69 (28%) patients had venous thromboembolism (VTE) and a high risk of recurrence, and 26 (11%) patients received a filter due to recurrent VTE while on anticoagulant therapy. Of 236 patients who survived the first month after diagnosis of VTE, VCF was retrieved in 96%. Retrieval rates were significantly lower for patients with recurrent VTE while on anticoagulation, compared with patients with contraindication to anticoagulation or patients with a high risk of recurrence (79% vs 97% vs 100%, respectively; $P<0.01$). Mean time to retrieval attempt was significantly associated with retrieval failure (137.8±65.3 vs 46.3±123.1 days, $P<0.001$).
Conclusions: In this single center study, VCF retrieval success was 96%. A delay in the attempt to retrieve the VCF correlated significantly with retrieval failure.

Éxito en la recuperación de filtro de vena cava inferior opcional: Análisis de 246 pacientes

Palabras clave:
Tromboembolia de pulmón
Filtros de vena cava
Retirada
Complicaciones

RESUMEN

Objetivo: El objetivo de este estudio fue calcular el porcentaje de filtros de vena cava inferior (FVCI) opcionales finalmente recuperados y las variables asociadas a la imposibilidad para su recuperación en una cohorte de pacientes con enfermedad tromboembólica venosa (ETEV).
Métodos: Se realizó un estudio observacional retrospectivo. La variable principal fue el porcentaje de FVCI recuperables finalmente extraídos. Se realizó regresión logística para identificar las variables asociadas al fracaso de la recuperación del FVCI.

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Resultados: Durante el período de estudio se implantaron 246 FVCI, 151 (61%) en pacientes con contraindicación para la anticoagulación, 69 (28%) para la prevención de tromboembolia de pulmón en pacientes de alto riesgo y 26 (11%) en pacientes con recurrencia trombótica a pesar de anticoagulación correcta. De los 236 pacientes que sobrevivieron el primer mes, se intentó la retirada del FVCI en todos ellos y fue posible en 226 pacientes (96%). La tasa más baja de retirada se produjo en el grupo de pacientes con recurrencias trombóticas mientras estaban anticoagulados, comparados con los pacientes con contraindicación para anticoagular y con los pacientes de alto riesgo (79 vs 97 vs 100%, respectivamente; p<0,01). El tiempo de retraso hasta el intento de retirada fue significativamente mayor para los pacientes a los que no se les pudo retirar el FVCI (137,8±65,3 días) comparados con los pacientes a los que se les pudo retirar el FVCI (46,3±123,1 días; p<0,001).
Conclusiones: En este estudio de un único centro se consiguió la retirada del FVCI en el 96% de los casos. El retraso en el intento de retirada del FVCI se asoció de manera significativa al fracaso en su extracción.

Introduction

Despite advances in diagnosis and treatment, venous thromboembolism (VTE) remains a significant cause of morbidity and mortality.[1,2] The accepted treatment for hemodynamically stable patients is anticoagulation, while reperfusion treatments (e.g., fibrinolysis) are reserved for unstable patients in the absence of contraindications for use.[3,4] Earlier studies have shown that, despite their efficacy in the prevention of pulmonary thromboembolism (PTE), inferior vena cava (IVC) filters increase the risk of deep vein thrombosis (DVT) and do not improve survival in patients with PTE.[5,6] For this reason, clinical practice guidelines do not recommend the use of these devices in the first-line treatment of VTE.[4,7] The major indication for IVC filters is contraindication for anticoagulation (evidence grade IB).[3] However, while the use of these devices has plateaued or even decreased in Europe,[8] it has gradually increased in the United States.[9,10]

Most studies published to date refer to permanent IVC filters or to older models. Clinical evidence on the efficacy and safety, indications, follow-up, and retrieval time of optional IVC filters is limited.[11] Even when these devices are retrievable, they are withdrawn in less than 50% of recipients,[12] and removal rates are inversely related to the time that the IVC filter remains in place.[11] Numerous complications associated with permanent IVC filter placement have been described,[13,14] prompting the Food and Drug Administration to issue several alerts and recommendations for the retrieval of these devices as soon as they are no longer necessary.[14]

The aim of this study was to analyze the baseline characteristics of a cohort of patients who received a retrievable IVC filter for the prevention or treatment of VTE. We also calculated the percentage of IVC filters retrieved, and explored complications associated with their placement and removal, and variables associated with failure to retrieve.

Method

Design

This was a retrospective observational study to analyze the baseline characteristics and progress of a patient cohort with a diagnosis of VTE who received a retrievable IVC filter. All patients or their legal representatives gave their signed informed consent in accordance with the requirements of the local ethics committee.

Patients and Selection Criteria

All patients consecutively diagnosed with acute symptomatic PTE or VTE in the Minimally Invasive Image-Guided Surgery Unit of the Hospital Universitario Lozano Blesa, Zaragoza (Spain), between January 2006 and March 2016, were included.

The diagnosis of PTE was confirmed by computed tomography (CT) angiography findings of a partial intraluminal defect surrounded by contrast medium or complete occlusion of a pulmonary artery in 2 consecutive CT slices.[15] PTE was diagnosed by ventilation/perfusion scintigraphy in patients with a high probability of PE according to PIOPED criteria[16] (at least 1 segmental perfusion defect or 2 subsegmental defects with normal ventilation), or on the basis of an inconclusive scintigraphy and positive diagnostic ultrasound of the lower limbs in cases with clinical suspicion of PTE. DVT was diagnosed when compression ultrasound revealed a compressibility defect of the lumen.[17]

Filter Implantation and Removal

Both retrievable IVC filters used in the study (Gunther® and Celect®) were manufactured by Cook Medical (Bloomington, Indiana, US) (Fig. 1).

Both filters can be inserted via the femoral or the jugular vein using a 7-French (Fr) introducer sheath. The device should be retrieved via the jugular vein, using an 11-Fr sheath. When removal of the IVC filter was indicated, a cavogram was performed to assess the existence of complications.[18] In our series, anticoagulation was not discontinued for the procedure, the retrieval set recommended by the manufacturer was used as the first option, and the approach of choice was the right jugular route (Fig. 2).

If IVC filter removal was not achieved, the attempt was repeated using a different strategy (e.g., with simultaneous femoral and jugular access, balloons, ligatures, forceps, or excimer laser).[19,20] After 3 failed attempts, the IVC filter was left as permanent, and the patient continued to receive coagulation.

Study Episodes

The primary evaluation parameter was defined as the percentage of retrievable IVC filters finally removed. Secondary parameters were the percentage of complications associated with the placement or removal of the IVC filter, and all-cause death during the first year following IVC filter placement.

Statistical Analysis

Continuous variables were expressed as mean±standard deviation or median (interquartile range), as appropriate, and were compared with the Student's *t* test or the Mann–Whitney *U* test for asymmetric data. Categorical variables were represented as percentages and compared using the Chi-square test or Fisher's exact test, if necessary.