subjects with type 2 diabetes status, whereas no exercise was superior to resistance and combined exercise for improving mental health status. The authors claimed insufficient statistical power and/or the effect of fatigue to explain the lack of improvement in the physical component summary measures with mixed training and attributed to a “reversion to the mean” phenomenon the improvement in the mental component summary measures in the control group, starting with a lower mean score at baseline than the exercise intervention groups.

A possible limitation of this study, in addition to intrinsic limitation of the SF-36 survey, is the unblinded design, though blinding is not feasible in clinical trials using behavioral interventions. Strengths of this study are that it was multicenter, thus less dependent on local factors, and of larger size and longer duration than other exercise intervention trials in patients with type 2 diabetes, including those assessing QoL and well-being measures.2-4

In conclusion, this large trial shows that the health benefits induced by supervised mixed exercise training on top of counseling include a significant improvement of physical and mental health-related QoL measures. Thus, this intervention strategy may be effective for promoting permanent lifestyle changes in subjects with sedentary habits, such as patients with type 2 diabetes.

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**Author Contributions:** Drs Nicolucci and Balducci contributed equally to this work. All authors had access to all the data in the study and take full responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Nicolucci, Balducci, Zanuso, and Pugliese. Acquisition of data: Nicolucci, Balducci, Cardelli, Zanuso, and Pugliese. Analysis and interpretation of data: Nicolucci, Balducci, Cardelli, Zanuso, and Pugliese. Drafting of the manuscript: Pugliese. Critical revision of the manuscript for important intellectual content: Nicolucci, Balducci, Cardelli, and Zanuso. Statistical analysis: Nicolucci. Obtained funding: Balducci. Administrative, technical, and material support: Balducci and Zanuso. Study supervision: Balducci and Pugliese.

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**Online-Only Material:** The eAppendix is available at http://www.archinternmed.com.

**Additional Contributions:** Stefano Cavallo, MD, Sara Fallucca, PhD, Alessandra Bazuro, MD, Paola Simonelli, MD, and Carla Iacobini, PhD, from the Department of Clinical and Molecular Medicine, “La Sapienza” University, Rome, Italy, participated in the acquisition of data and critical revision of the manuscript.


**Retrieval of Inferior Vena Cava Filters After Prolonged Indwelling Time**

Pulmonary embolus (PE) remains the leading cause of preventable mortality in surgical patients and the third leading cause of death in hospitalized trauma patients.1 This has contributed to the 4-fold rise in use of inferior vena cava (IVC) filters following Food and Drug Administration approval of the first retrievable (or optional) IVC filter in 2003.2 Although IVC filters are efficient at preventing PE, they may be associated with an increased risk of venous thrombosis.
basis and other complications. Filter retrieval rates remain less than 50%, with many reports citing an incidence less than 15%. Some reasons for failure of retrieval are related to prolonged indwelling time with associated potential for complications and medical comorbidities, which may also increase the risk of the procedure and/or increase mortality in cases of subsequent PE. We summarize our experience with successful filter retrieval after a prolonged indwelling time and also to describe barriers encountered in removing filters.

**Methods.** After obtaining institutional review board approval, a retrospective study was performed on all IVC filters inserted from January 2004 to July 2009 and from January 2010 to June 2011. A dedicated database and advanced practitioner were used to track patients and assess feasibility of filter removal.

We tracked several retrievable filters; the G2 filter (Bard Peripheral Vascular), which is recommended for removal up to 300 days, the Gunther Tulip filter (Cook Medical), which is recommended for removal up to 20 days, and the Celect filter (Cook Medical), which is approved for removal up to 469 days following insertion.

**Results.** A total of 289 consecutive patients underwent IVC filter placement, 19 of whom were lost to follow-up. Filters placed included 211 G2 filters, 57 Gunther Tulip filters, and 2 Celect filters. The mean (SD) patient age was 51 (21) years, and follow-up time was 2.3 years (range, 70 days to 5.8 years). From 2004 to 2009, IVC filter retrieval was attempted in 97 patients and successfully completed in 90 (33%). The number of filters placed increased from January 2010 to June 2011 but the retrieval rate remained only 22%.

The most common reason for IVC filter placement was prophylaxis in patients with significant risk factors for venous thromboembolic disease (VTED) in whom pharmacologic prophylaxis was contraindicated (n=145). The other common indications for filter placement included recurrent VTED despite anticoagulation (n=83) and bleeding complications related to anticoagulation in patients with known VTED (n=24). Similarly, of filters removed, the majority (45%) were initially placed for prophylactic reasons. The incidence of filter removal by indication for initial placement in the remaining cases was confirmed VTED when anticoagulation was contraindicated (22%), VTED despite adequate anticoagulation (15%), and VTED with hemorrhage following anticoagulation (13%).

The mean (SD) indwelling time for the entire cohort was 209 (102) days. We successfully removed 7 Gunther Tulip filters following a mean (SD) indwelling time of 124 (46) days and 81 G2 filters following a mean (SD) indwelling time of 217 (103) days and a maximal indwelling time of 458 days. There were no complications during the removal process in any patient.

The most common reason for not removing a filter was physician preference despite 35% of filters in this group having been placed for prophylaxis. Inability to remove a filter was cited in only 7 instances. Inability to anticoagulate a patient with known VTED constituted the second most common reason for not removing a filter. The decision to not remove filters in patients older than 70 years was made after consultation between the interventional radiology staff and the referring physicians and constituted the third most common reason for retaining a filter.

**Comment.** The incidence of IVC filter insertion has increased dramatically since the FDA first approved the placement of retrievable (or optional) IVC filters in 2003. Despite reports of complications related to prolonged indwelling of IVC filters, retrieval rates remain well below 50% in most reports. Our study found that IVC filters can be removed safely following prolonged indwelling times but also confirmed the low overall retrieval rate. The most common reason for not attempting retrieval was physician refusal. This is particularly striking given that 54% of filters were placed for prophylactic reasons. Furthermore, the reason cited for not removing the filter in an additional 18% of patients was inability to anticoagulate. However, the 2008 American College of Chest Physician guidelines specifically recommend that IVC filters be removed 6 months following a pulmonary embolus irrespective of the ability to anticoagulate the patient. Retrieval rate was not changed following publication of these guidelines.

In conclusion, retrieval rates of IVC filters remain low despite guidelines urging timely removal to mitigate filter-related complications. Educational efforts regarding the importance and safety of filter removal should be directed to physicians who refer patients for IVC filter placement, and future studies evaluating the efficacy of this approach in improving IVC filter removal rates are needed.

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Table. Reasons IVC Filter Retrieval Was Not Attempted*

<table>
<thead>
<tr>
<th>Reason</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician refused</td>
<td>37 (21)</td>
</tr>
<tr>
<td>Unable to anticoagulate</td>
<td>33 (18)</td>
</tr>
<tr>
<td>Age &gt;70 y</td>
<td>28 (16)</td>
</tr>
<tr>
<td>Deceased</td>
<td>27 (15)</td>
</tr>
<tr>
<td>VTED on anticoagulation</td>
<td>5 (3)</td>
</tr>
<tr>
<td>Prolonged immobility</td>
<td>13 (7)</td>
</tr>
<tr>
<td>Terminal disease</td>
<td>7 (4)</td>
</tr>
<tr>
<td>Failed retrieval</td>
<td>7 (4)</td>
</tr>
<tr>
<td>Pending retrieval</td>
<td>11 (6)</td>
</tr>
<tr>
<td>Pending operation</td>
<td>1 (0.6)</td>
</tr>
<tr>
<td>Clot in filter</td>
<td>1 (0.6)</td>
</tr>
<tr>
<td>Unknown</td>
<td>10 (6)</td>
</tr>
</tbody>
</table>

Abbreviations: IVC, inferior vena cava; VTED, venous thromboembolic disease.

*All failed attempts were due to filter tilting; 1 failed attempt also had endothelialization along with tilting.
The controversy surrounding patient selection for IVC filter placement is reflected in the disparate recommendations found in guidelines from various sources (Table). The only currently agreed-on indication for IVC filter placement is prevention of PE in the setting of DVT and a contraindication to anticoagulation. Other indications remain controversial. While filters were once commonly placed in patients who developed recurrent or progressive DVT or PE despite anticoagulation, now most experts recommend an increase in intensity of anticoagulation or initiation of an alternative anticoagulant rather than placement of a device. Despite practitioners’ concerns, free-floating thrombus