Placement of Inferior Vena Cava Filters in Bariatric Surgical Patients – Possible Indications and Technical Considerations

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Background: Surgical treatment of the morbidly obese has assumed an increasingly important role in both the academic and community setting, while postoperative pulmonary embolism remains a devastating complication. Since the overall incidence remains low, the role for vena cava filter placement in this group is not yet well defined. In addition, the technical challenges and techniques for insertion have not been well-described. We present our experience with filter placement among patients with gastric bypass and the evolution of technique to facilitate safe placement in this group.

Methods: From 1995 to August 2003, 586 patients underwent gastric bypass for morbid obesity. Review of registries and records from this period was accomplished to identify patients at MUSC who underwent both the gastric bypass and placement of an inferior vena cava filter. 12 patients were identified by this method.

Results: Technical challenges with venous access and imaging are described. 6 patients were identified as potential high risk for thromboembolic complications and had a filter placed preoperatively with a mean postoperative stay of 5.3 days. The 6 patients who required filter placement in the postoperative period as part of the management of postoperative complications had a mean hospital stay of 24.5 days. There were no long-term complications associated with filter placement at a mean follow-up interval of 19 months.

Conclusion: Inferior vena cava filter placement is not only feasible and safe for the morbidly obese individual undergoing gastric bypass, but should be strongly considered for patients with risk factors for thromboembolic complications or who experience postoperative complications requiring ICU stay or prolonged immobility.

Key words: Inferior vena cava filter, gastric bypass, bariatric surgery, morbid obesity, pulmonary embolism, deep venous thrombosis

Introduction

Morbid obesity has become a major public health concern in the United States today, and despite educational awareness, the problem continues to grow. In 1999, a report in JAMA listed the prevalence of obesity in the 18 to 29 year age group to be an astonishing 18.9%. 1 Morbid obesity, defined as a BMI ≥ 40, has a reported incidence of 2 to 5% in men and 6 to 7% in women. 2 With continuing failure in the general population to lose weight with diet and exercise, and poor advances in the pharmacological treatment of obesity, surgical treatment of the morbidly obese has assumed an increasingly important role in both the academic and community setting. Although gastric bypass has been documented to be very effective (patients can expect to lose at least 60% of their excess weight within 2 years), 3 it remains a challenging operation in a population already fraught with weight-related co-morbidities, which predispose to numerous potential peri-operative complications.

One of the most feared complications of bariatric surgery is deep venous thrombosis (DVT) and pul-
monary embolism (PE). The incidence of PE in this patient population is widely variable depending on the study cited. Although there is no definitive prospective study, the incidence appears to be between 0.7% and 2.4%, although the actual incidence of clinically silent DVT/PE may be much higher. One postmortem study of Roux-en-Y gastric bypass (RYGBP) illustrated that while only 20% of patients were suspected clinically to have pulmonary emboli, 80% had microscopic evidence at autopsy that may have contributed to morbidity and mortality. The patients in this study had all been prophylactically treated for DVT, which makes these numbers even more intriguing.

The risk of DVT and PE in morbidly obese surgical patients is commonly attributed to immobility related to excess weight, degenerative disk/joint disease, and limited mobility following any postoperative period, but also includes metabolic factors unique to the obese state. Morbidly obese individuals may be relatively polycythemic due to respiratory insufficiency, which promotes endothelial stasis and subsequent DVT. Additionally, abnormalities in the coagulation and fibrinolytic pathways caused by various adipocyte-secreted factors including plasminogen activator inhibitor-1, adipins, adipocyte complement-related protein, and adiponectin may be related to an increased incidence of DVT/PE.

Although the overall incidence is relatively low, PE may prove fatal, particularly in those patients with limited cardiopulmonary reserve. At least one death due to PE has been reported by 48% of bariatric surgeons. Because of these possible fatal consequences and the difficulty of accurate clinical diagnosis of PE, it is common practice to use routine prophylaxis in all bariatric surgical patients. Although there is no clear consensus on the best method of prophylaxis, according to a poll of the members of the American Society for Bariatric Surgery, 95% reported using some method of prophylaxis. The most common methods utilized are unfractionated low dose heparin, low molecular weight heparin (LMWH), or a combination of intermittent compression devices and LMWH. Like 38% of bariatric surgeons in this study, in our practice we prefer to use a combination of sequential compression devices and LMWH until fully ambulatory. Given the risk of fatality from PE in patients with respiratory insufficiency of obesity and those with pulmonary hypertension, Sugerman et al reported placing prophylactic Greenfield® vena caval filters in a select subset of these patients who have a documented pulmonary arterial pressure >40 mmHg. The indications for vena caval filter placement and the technical difficulties within this subgroup of patients form the basis for this report. We describe our experience with placement of prophylactic Greenfield® filters (Boston Scientific, Natick, MA, USA) in RYGBP patients from both a technical aspect and clinical efficacy.

Materials and Methods

From 1995 to August 2003, 586 patients underwent RYGBP for morbid obesity; 116 were performed laparoscopically. Review of computer registries, physician record logs, and electronic medical records at MUSC from 1995 to 2003 were used to identify patients given CPT (Current Procedural Terminology, American Medical Association, 2003) diagnostic codes for both a gastric restrictive/gastric bypass procedure and placement of an inferior vena cava (IVC) filter. Twelve patients were identified by this method, and to our knowledge represent all patients who underwent both procedures during this period at MUSC. Subsequently, both the electronic record and paper clinic charts were evaluated. Included for analysis were demographic factors, weight at time of operation, indication for procedures, timing of placement (pre or post-gastric bypass), complications of filter placement, subsequent development of DVT/PE, use of anticoagulation after discharge, length of hospital stay, length of follow-up, and subsequent hospital admissions (Table 1). All patients underwent a RYGBP for the morbid obesity, and received Greenfield® IVC filters in either the preoperative or subsequent postoperative period, inserted by the vascular surgery service in the operating suite.

Technical Aspects of Vena Cava Filter Placement

Venous access is the most challenging aspect of filter deployment in this patient population. Although