Acute respiratory failure from Surgifoam expansion after anterior cervical surgery

Case report

Branko Skovrlj, M.D.,1 Justin R. Mascitelli, M.D.,1 Martin B. Camins, M.D.,1 Amish H. Doshi, M.D.,2 and Sheeraz A. Qureshi, M.D., M.B.A.3

Departments of 1Neurosurgery, 2Radiology, and 3Orthopaedics, Mount Sinai School of Medicine, New York, New York

A 65-year-old woman underwent an uneventful C3–4 anterior cervical discectomy and fusion for a large, symptomatic disc herniation. On postoperative Day 1 the patient suffered a sudden, acute respiratory compromise. Emergency fiberoptic intubation revealed significant anterior neck swelling with concern for physical obstruction of the airway. Computed tomography of the neck did not demonstrate an expanding hematoma. The patient was managed with surgical wound exploration and washout. Examination of the anterior neck after incision of the prior surgical site revealed a large volume of Surgifoam under high pressure, which was greater than the amount used during the initial surgery. Thorough washout of the surgical site did not reveal any swelling of the prevertebral soft tissues or hematoma, and the Hemovac drain did not appear to be occluded. The patient was extubated on the 2nd postoperative day and is symptom free 12 months after surgery. To the authors’ knowledge, this report represents the first reported complication of acute respiratory failure from Surgifoam overexpansion after anterior cervical surgery.

Key Words • Surgifoam • ACDF • acute respiratory failure • anterior cervical discectomy and fusion • complication • cervical spine

One of the most serious and potentially life-threatening adverse events associated with anterior cervical spine surgery is postoperative airway obstruction. The most common causes of acute postoperative airway obstruction after anterior cervical discectomy and fusion (ACDF) surgery are prevertebral soft-tissue swelling, cerebrospinal fluid leakage, and wound hematoma.2,5,8,10–12,15,17 The most serious of these is postoperative airway obstruction due to an expanding wound hematoma.18 For this reason, achieving hemostasis during ACDF surgery is of critical importance. Various mechanical, electrical, and chemical methods of achieving hemostasis are used in all spine surgeries, including those in the cervical spine.19 The small size and depth of the operative field, as well as the fragility of the spinal cord, limit the use of compressive techniques to achieve hemostasis. Epidural bleeding from oozing of dilated epidural veins responds poorly to electrocautery. Bipolar cautery causes complete occlusion of bleeding vessels, which can compromise perfusion to distal tissues and can lead to localized thermal injury. For these reasons, the use of local, absorbable, chemical hemostatic agents is an excellent adjuvant for controlling bleeding during cervical spine surgery. Many of these adjuvants can expand to a variable degree postoperatively.

We present a case of Surgifoam overexpansion causing severe anterior neck swelling leading to acute respiratory failure that necessitated emergency intubation and surgical exploration. To our knowledge, Surgifoam use in the anterior spine has not been reported previously in association with acute respiratory failure after ACDF.

Case Report

This obese 65-year-old woman with multiple medical problems presented in March 2012 with complaints of increasing neck pain, paresthesias in the right hand, and recurrent gait imbalance after successful C4–6 ACDF surgery performed in November 2010. Physical exami-
Respiratory failure from Surgifoam expansion

nation findings were unremarkable except for an inability to walk in tandem gait. Magnetic resonance imaging showed a left paracentral disc herniation at C3–4 causing compression of the anterolateral spinal cord (Fig. 1). At this point, the patient was offered, and elected, to undergo a C3–4 ACDF. The surgery was uneventful with minimal soft-tissue manipulation. A PEEK (polyetheretherketone) Prevail (Medtronic Sofamor Danek) cervical interbody device filled with autograft shavings was implanted after discectomy at C3–4. No bone morphogenetic protein or other biological substrates were used in this case. Epidural as well as soft-tissue oozing was controlled using a local application of Surgifoam. Approximately 4 ml of Surgifoam was injected into the wound to achieve final hemostasis. The wound was irrigated, and a Hemovac drain was left in place prior to wound closure. The patient was extubated with no complications and did well immediately postoperatively.

On the morning of postoperative Day 1, the patient began having difficulty speaking and swallowing. There was no output in the Hemovac drain. She rapidly became short of breath, at which time her oxygen saturation decreased to 80% and her heart rate climbed to 140 bpm. An emergency fiberoptic intubation was performed, during which significant edema of the neck with physical obstruction of the airway was observed. After intubation her hemodynamic parameters normalized, and arterial blood gas analysis did not point to pulmonary embolus as a cause of her deterioration. She underwent noncontrast CT scanning of the neck, which demonstrated nonspecific postoperative changes including prevertebral and left neck–soft tissue swelling without evidence of a hypodense collection to suggest hematoma. There was no CT evidence of a hardware complication (Fig. 2).

The patient was urgently taken to the operating room for wound exploration. In the operating room her neck appeared edematous and tense. At the time of suture removal, a large amount of highly pressurized, foamy material that did not look like abscess was seen exiting the wound. This material was sent for Gram staining and culture and yielded few white blood cells and no organisms. No specimen was sent to pathology. The wound was fully opened and thoroughly washed out. The soft tissues of the anterior neck were closely inspected and did not appear edematous to any significant degree. There was no evidence of hematoma, and no bleeding vessel was encountered. The Hemovac drain did not appear to be occluded with blood products or Surgifoam. A layered closure was performed after a new Hemovac drain was left in place. Postoperatively, the neck appeared less tense. The patient was placed on a regimen of high-dose steroid therapy that was tapered over several days. She was extubated after 48 hours. The remainder of her postoperative course was uneventful. At the 12-month postoperative follow-up visit she was symptom free.

Discussion

There are multiple reports of postoperative complications related to mass effect of local hemostatic agents.1,3,4,6,7,9,13,14,16 A literature search revealed no reports of Surgifoam overexpansion after anterior cervical surgery leading to acute postoperative respiratory compromise.

Surgifoam is a porcine gelatin absorbable powder or sponge that provides a matrix for platelet adhesion and aggregation (http://www.ethicon360.com/products/surgifoam-absorable-hemostat). It is usually used with thrombin to aid in fibrin clot formation. A property of gelatin sponge hemostatic agents is their ability to absorb upwards of 40 times their weight in whole blood or fluids as well as their capacity to expand up to 200% in vivo.20 When electrocoagulation is not indicated, such as in narrow cervicothoracic epidural spaces, venous bleeding can be successfully managed using Surgifoam. On the other hand, bleeding from soft tissues, as well as muscle, should be treated with electrocautery instead of placing a large amount of Surgifoam which, other than producing mass effect with its overexpansion, may occlude Hemovac drain holes.

The significance of this report of postoperative acute respiratory failure due to Surgifoam mass effect lies in its similarity of presentation to postoperative cervical hematoma. This report outlines the critical importance of thor-
though and complete irrigation of all Surgifoam material from the surgical site prior to wound closure as well as the correct use of Surgifoam in contrast to electrocautery.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author contributions to the study and manuscript preparation include the following. Conception and design: Skovrlj. Acquisition of data: Skovrlj. Analysis and interpretation of data: Skovrlj. Drafting the article: all authors. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Skovrlj.

References


Fig. 2. Postoperative axial CT images obtained through the level of C-2 (A and B) and C-3 (C) demonstrating hypodensity and thickening along the prevertebral soft tissues and airway (thin white arrows). Mixed-density fluid and soft tissue is noted along the left neck with effacement of the normal fat planes (black arrows). An endotracheal tube is seen (thick white arrow in A).