



Gelfoam Granuloma Mimicking Brain Abscess Following Decompressive Craniotomy

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Abstract

The use of adjuvants in brain surgery has increased. Artificial adjuncts are being used in neurosurgery frequently. These foreign materials may result in a foreign body reaction inside the normal brain tissue surrounding the areas of pathology. This material may mimic an abscess or tumor in their presentation and masquerade the magnetic resonance (MR) or computed tomography (CT) image as recurrence, abscess, or granuloma. We present a case of a 42-year-old woman with a history of hypertensive basal ganglia bleeding who was operated on in an emergency. Decompressive craniectomy and clot evacuation were carried out. A thin layer of Gelfoam was applied in the operated area. After 4 weeks, she was planned for cranioplasty where an oval soft to firm yellowish lesion was found at the site of the previous cavity of the evacuated clot, which was sent for biopsy and it was confirmed as a Gelfoam granuloma. Meticulous use of hemostatic agents in the form of small surgical or thin waferlike gelatin sponges should be used intraoperatively. Large-size Gelfoam and artificial agents can lead to foreign body-like granulation tissue formation in normal brain tissue and several complications like hydrocephalous, meningitis, and seizures. **Peculiarities in this case** include the following: Gelfoam granuloma is a very rare complication following cranial surgery, it was mimicking like an abscess, and the size of Gelfoam used intraoperatively should be a thin wafer coating the raw surface or in the cavity.

Keywords

- ▶ Gelfoam granuloma
- ▶ decompressive craniectomy
- ▶ brain abscess

Introduction

Hemostasis is an essential part of any neurosurgical intervention. In an event of any hemorrhage, the body naturally tries to contain bleeding by natural coagulation. However, challenging hemostasis situations can occur. To tackle this, various neurosurgical methods have been developed, which include thermal, mechanical, and biochemical methods of hemostasis.

Thermal hemostasis was found as far as Egyptian times. Bone wax was introduced by Victor Horsley for bone bleeding. Biochemical hemostasis was started by Hippocrates, using caustic agents such as copper sulfate. However, these agents are no longer used.¹

Electrocoagulation was developed in the 1920s by Bovie and Cushing.² Gelatin foam (GF) was introduced as a hemostatic agent in 1945²⁻⁴ and has been in use for the past eight decades, and most reports have favored its use.^{5,6}

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Other than these, a lot of other foreign materials like duroplast, Teflon, sutures, etc., were used inside the cranial cavity for hemostasis. However, increasing use of all these materials has been associated with foreign body like reactions and can present clinically as seizures, meningitis, and neurological deficits. Computed tomography (CT)/magnetic resonance imaging (MRI) of these mimics an abscess or a tumor.⁶

We, hereby, present a similar unique case where a lesion mimicking a brain abscess turned out to be a Gelfoam granuloma upon excision and examination.

Case Report

We present the case of a 42-year-old woman with a hypertensive bleed within the left basal ganglia (►Fig. 1A). She underwent an emergency decompressive craniectomy along with clot evacuation through a small corticotomy. Thereafter, the raw surface of the cavity was covered with a single layer of Surgicel followed by a moderate-size Gelfoam for hemostasis. This was followed by a duroplasty and scalp closure. The bone flap was preserved in the abdominal wall. After 4 weeks, the patient was admitted for cranioplasty. A previous repeat noncontrast CT brain showed a hyperdense ringlike lesion in the left basal ganglia region with cranial defect (►Fig. 1B). Suspecting it to be an abscess at risk of complications if left unattended, an exploration and excision of the lesion followed by autologous bone cranioplasty was done. The lesion measured 2 × 2 cm, was dark yellowish, soft to firm with adhesions to the brain tissue, and it was removed for a pathological examination. The lesion was cut open, which

revealed a gel-like material at the center with a firm to hard surface surrounding it (►Fig. 1C).

The histopathological examination revealed a gelatin sponge surrounded by multinucleated giant cells and fibroplasia. The findings were consistent with a diagnosis of a foreign body granuloma induced by gelatin sponge, which confirmed “a Gelfoam granuloma.”

Discussion

The use of various adjuvants inside the cranial cavity has increased in the recent past.^{5,6} The use of Teflon for microvascular decompression, artificial G patch for the duroplasty, Surgicel for hemostasis, Gelfoam or sponston, clips, shunts, etc., has resulted in foreign body-like reactions within the brain tissue.^{4,6}

Al-Afif et al performed a systematic review of 3,466 histopathological examinations post brain surgeries spanning over 13 years. Excluding Teflon granulomas, a total of 12 patients with synthetic material granulomas used in a prior surgery were identified.⁶

The incidence of Gelfoam granuloma is very rare.^{7,8} As Gelfoam is an absorbable material, most of the material is not retained after 2 to 3 weeks of surgery. However, using a large AbGel (absorbable gelatin) material leads to incomplete absorption and later on it develops a foreign body-like granulation tissue reaction, which mimics a tumor recurrence or an abscess.⁷ Ventricular obstruction with Gelfoam can lead to hydrocephalus.⁸

Prabhu et al analyzed 8,000 cases over the last 25 years with excellent hemostatic results and they concluded that

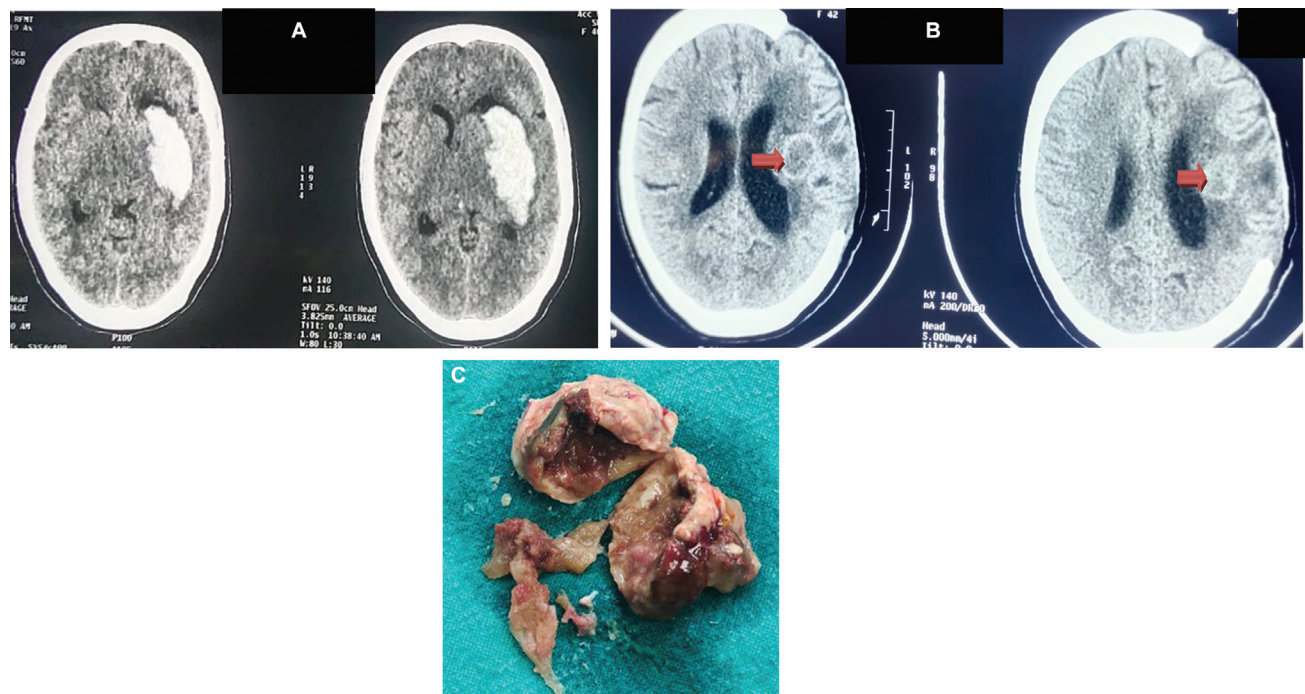


Fig. 1 (A) Hypertensive bleed on the left basal ganglia. (B) Noncontrast computed tomography (CT) of the brain showed a hyperdense abscesslike lesion on the left basal ganglia region postdecompression. (C) The lesion was cut open, which revealed a gel-like material (Gelfoam) at the center with a firm to hard surface surrounding it.

Table 1 The list of previously reported foreign body reactions to Gelfoam-related hemostatic agent

Sl. no.	Year of publication	Authors	Title	Journal
1	2018	Al-Afif et al ⁶	Intracranial foreign material granulomas after cranial surgery	Acta Neurochir (Wien)
2	2010	Kawano et al	Foreign body granulomatous change from absorbable gelatin sponge and microcoil embolization after a guidewire-induced perforation in the distal coronary artery	Intern Med
3	2009	Shashoua et al	Casating granulomata caused by hemostatic agent posing as metastatic leiomyosarcoma	JSLs
4	2001	Kothbauer et al ⁷	Foreign body reaction to hemostatic materials mimicking recurrent brain tumor. Report of three cases	J Neurosurg
5	1986	Aderhold et al	Tuberculoid tissue reactions following implantation of a resorbable gelatin preparation	Quintessenz
6	1974	Knowlson ⁵	Gel-foam granuloma in the brain.	J Neurol Neurosurg Psychiatry

using small waferlike Gelfoam in cavities is highly efficacious and less infective comparatively.⁴

AbGel sponge is considered nonimmunogenic. It is synthesized from highly purified neutral Gelfoam of uniform fine porosity. The mechanism of action is mechanical.² There are also theories that activation of platelets upon entering the interstitial matrix of the gel results in the release of thromboplastin, thereby activating the coagulation cascades.⁹

Gelfoam is an essential hemostatic agent. It is associated with many good properties. However, excessive use of Gelfoam is associated with foreign body reactions and the formation of granulation tissue surrounding the Gelfoam. The habit of putting a lot of hemostatic material should be restricted and minimal use of these materials should be the policy in our surgery.¹⁰ ► **Table 1** provides a list of previously reported foreign body reactions to Gelfoam-related hemostatic agents.

Conclusion

Meticulous use of hemostatic agents in the form of small Surgicel or thin wafers like gelatin sponges should be practiced intraoperatively. Large-size Gelfoam and artificial agents can lead to foreign body-like granulation tissue formation in normal brain tissue and several complications like hydrocephalus, meningitis, and seizures.

Conflict of Interest

None declared.

Acknowledgment

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