Hemostasis in Otologic and Neurotologic Surgery

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KEYWORDS

• Hemostasis • Bleeding • Middle ear • Mastoid • Lateral skull base

KEY LEARNING POINTS

At the end of this article, the reader will:

- Understand the factors that make a hemostatic agent more ideal for use in different situations.
- Appreciate the patient factors that limit use of topical agents.
- Review the blood supply for paragangliomas of the middle ear and jugular foramen.

INTRODUCTION

Why is bleeding during otologic and neurotologic surgery a problem?

- The combination of a small surgical field and very small critical structures increases the risk of injury due to poor visualization.
- Incomplete surgery due to poor visualization can easily occur.
- Postoperative bleeding can negatively impact
  - Tympanic membrane graft take
  - Positioning of middle ear prosthesis
  - Brain function/brainstem position in the case of neurotologic procedures and may lead to emergent surgery to control bleeding
- Wound hematomas can lead to
  - Postoperative discomfort
  - Short term inability to wear glasses
  - Wound infection
    - Device removal may ultimately follow wound infection in the case of cochlear implants.
    - Wound infection can lead to meningitis in neurotologic procedures.

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SURGICAL STRATEGIES

What are the strategies for control of bleeding during otologic and neurotologic surgery?

- Initial injection of vasoconstrictive medications along incision line
- Cautery (monopolar and bipolar)
- High-speed otologic drill with diamond burr
- Topical use of vasoconstrictive medications
- Topical hemostatic agents
- Angiography and embolization
- Angiography and stenting (internal carotid)
- Arterial ligations of branches of the external carotid artery

For most otologic surgeries, the most critical component of hemostasis is the initial injection of diluted epinephrine into the ear canal and any planned postauricular or pinna incision sites. Subsequent control of bleeding for these procedures often involves cautery. Use of the otologic drill with an appropriately sized diamond burr and irrigation is an effective means of controlling bleeding from the mastoid bone (Fig. 1). Topical agents should be used when cautery or drilling with a diamond burr would otherwise not be indicated, for example, when the bleeding process is adjacent to or on nerves or other delicate structures that would be damaged by heat transfer. Topical agents are also useful for control of bleeding in areas that are too small for introduction of the cautery.

Topical agents should be used cautiously in the sigmoid sinus and jugular bulb because of the potential for thrombosis. Careful use is also recommended in areas where excessive compression on nerves or other critical structures could occur. For otologic or neurotologic procedures involving vascular tumors, such as paragangliomas, preoperative angiography and embolization should be considered if possible. Emergent control of bleeding due to trauma or large tumors of the skull base may require embolization, stenting, or arterial ligation.

What are the goals of treatment?

- Removal of disease
- Repair of hearing
- Minimization of morbidity

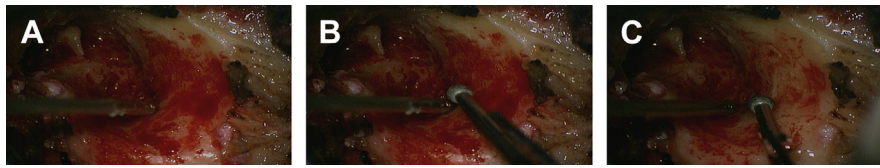

Fig. 1. Use of high-speed drill for hemostasis. (*A*) Bleeding from bony surfaces is common in surgery for chronic otitis media. (*B*, *C*) Use of a high-speed otologic drill with a diamond bur without irrigation can effectively control bleeding in this context.