Advances in Ophthalmology and Optometry 2 (2017) 409–420

ADVANCES IN OPHTHALMOLOGY AND OPTOMETRY

Orbital Floor Fracture Management: Toward a Consensus

Marie Somogyi, MD, Ivan Vrcek, MD, Tanuj Nakra, MD, Vikram Durairaj, MD*

TOC Eye and Face, 3705 Medical Parkway, Suite 120, Austin, TX 78751, USA

Keywords

• Orbital floor fracture • Orbital trapdoor fracture • Orbital blow-out fracture
• Oculoplastic surgery • Trauma • ASOPRS

Key points

- A thorough ophthalmologic examination is imperative in the setting of orbital and facial trauma.
- There are specific indications for orbital fracture repair, which also guide the recommended timing for surgical repair.
- Orbital floor fracture repair can be performed in a safe and effective way through minimally invasive techniques.
- There are a variety of implant choices and surgical approaches. In most cases, we prefer the transconjunctival approach and porous polyethylene implants.

INTRODUCTION

Orbital floor fractures are managed by a variety of surgical subspecialists, including oculofacial plastic surgeons, oral and maxillofacial surgeons, otolaryngologists, and plastic surgeons. Considerable controversy and variability exists in practice patterns for the surgical management of orbital fractures [1–11]. More importantly, limited evidence-based recommendations exist to clearly define a standard of care regarding the management of these patients [1–3].

The management of orbital floor fractures may depend on the surgeon's training background, clinical experience, and finally, on published literature. A consensus regarding the treatment of orbital fractures has evolved steadily

The authors have nothing to disclose.

*Corresponding author. *E-mail address:* vdurairaj@tocaustin.com

http://dx.doi.org/10.1016/j.yaoo.2017.03.016

over the years [12]. Beginning in 1957, Smith and Regan [13] established a pattern for clinical-decision making when confronted with orbital fractures. In 1974, Putterman and colleagues [14] recommended a more conservative, nonoperative approach to these injuries. Later, in 1983, Hawes and Dortzbach [15] established the need for early surgical repair to prevent enophthalmos, especially in large fracture sizes. Gilbard and colleagues [16] highlighted the importance of recognizing orbital volume expansion seen on computed tomography (CT). In 1987, Millman and colleagues [17] introduced the use of steroids in the medical management of orbital fractures and presented a protocol for surgical decision making. Following in 1998, Jordan and colleagues [18] identified a unique subset of orbital floor fractures; namely, the "white-eyed blow-out" that necessitates earlier surgical intervention. More recently, in 2002, Burnstine [19] presented a literature review to describe the natural history of orbit fractures, including indications for surgical repair and timing of intervention.

The management of orbital floor fractures continues to evolve with new surgical techniques and imaging technology. A current consensus regarding the evaluation, management, and treatment or orbital floor fractures is presented here to summarize the current standard of care.

SIGNIFICANCE (IN-DEPTH ANALYSIS)

Orbital fractures are a common sequelae of facial trauma. It is estimated that 10% of all facial fractures are isolated orbital wall fractures, most of which are the orbital floor. Furthermore, approximately 30% to 40% if all facial fractures involve the orbit [20–22].

A detailed knowledge of the anatomy of the orbit is critical to comprehending the natural history of orbital trauma. The medial orbital floor averages 0.37 mm thick and is thinnest over the infraorbital canal, whereas the lateral orbital floor is much thicker: typically 1.25 mm in thickness [23]. Blunt injury to the periorbital region increases the intraorbital pressure and can result in fracture at the thinnest portion of the floor. Alternatively, the blunt force of facial injury may be directly transmitted to the weakest point of orbital bone, usually along the infraorbital canal. Typically, isolated inferior orbital wall fractures occur over the very thin area of the infraorbital canal [23]. The bone medial and/or lateral to the canal may also fracture and become displaced downward into the maxillary sinus, resulting in the classic "blow-out" fracture. Orbital soft tissue may herniate downward into the sinus, and musculo-fibrous tissue, such as the inferior rectus and associated pulley structures, may become tethered to bone fragments (entrapped), resulting in diplopia and the potential for the oculocardiac reflex.

There are 2 commonly accepted theories regarding the mechanism of orbital blow-out fractures: the hydraulic and the buckling theories [23]. The hydraulic theory proposes that the elevation in intraorbital pressure transmits force to the orbital walls creating a fracture at the weakest point [13]. In contrast, the buckling theory maintains that direct trauma to the thick infraorbital rim transmits