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ORIGINAL ARTICLE

An innovative technique in orbital floor reconstruction avoiding complications: Temporary use of the silicone guide

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Summary *Background:* Orbital blowout fracture is a relatively common but challenging entity in the field of traumatology. Serious sequels may occur as a consequence of poor visualization or an inappropriate operative maneuver. We herein propose a modified technique featuring routine use of orbitotomy with temporary placement of a silicone shell as the guide template and soft-tissue barricade, thereby facilitating the mesh plate fashioning and expediting the implantation process.
Methods: Eleven patients underwent orbital floor open reconstruction with titanium orbital mesh plate implantation between January 2010 and December 2011. After thorough release of the herniated contents from entanglement, we tailored a silicone guide according to the size and shape of the defect and inserted it into the orbital cavity to hold up the soft-tissue contents. Another copy of silicone shell with exactly the same configuration was produced and taken as a reference to formulate the titanium plate. We removed this holding silicone guide after the placement of the orbital plate, avoiding incarceration between the plate and the herniated contents.
Results: Follow-up computed tomography scans 3 months after surgery demonstrated adequate reduction of the herniated contents. The patients were spared from complications such as diplopia or enophthalmos.
Conclusion: This innovative technique helps to simplify the operation, avoids complications, and is easily practicable.

Conflicts of interest: All contributing authors declare no conflicts of interest.

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1. Introduction

Orbital trauma and the resultant orbital blowout fracture are relatively common but challenging disorders. Surgical repair of this fracture is straightforward; however, the secluded location of the pathology, the intricate regional anatomy, and the existence of numerous vulnerable vital structures near the fracture sites make reconstruction a daunting task.

The titanium orbital mesh gives this reconstruction a stable buttress to support the orbit, especially when two or more adjacent orbital walls are destroyed.[1,2] This mesh has to be tailored in accordance with the size and shape of the defect prior to insertion.[3] Impingement of soft tissue during deployment of this mesh may occur if the soft tissue is not held adequately by the instrument.[4] An appropriate retractor or barricade device is mandatory to facilitate the intervention process, and that device should be something with the size and shape similar to those of the defect, sturdy enough to hold up the herniated content while being flexible enough to be rolled up and set in through a limited incision.

Two identical customized silicone guides cut out from the suction drain bulb solve this problem. One serves to hold up the herniated contents, expediting the placement of metal implants, and the other one helps to fabricate a precise orbital plate for reconstruction. With this technique, we were able to successfully create a well-visualized operation field and effectively streamline the insetting maneuver of the orbital plate in 11 patients in the past 2 years.

2. Patients

A total of 11 consecutive patients underwent open orbital reconstruction with titanium orbital mesh plate implantation between January 2010 and December 2011 (Table 1). All reconstructions were performed by a single surgeon (J.-W.L.). This reconstruction series included six males and five females, and the mean age was 30 years. Prior to surgery, enophthalmos was noted in all but one of them (10 cases, or 91%), diplopia in seven cases (64%), and extraocular movement limitation in five cases (45%). Six of them had pure orbital blowout fracture (55%), three of them suffered from complex zygomatic fracture (27%), and the remaining two were diagnosed to have panfacial fracture. Seven of them underwent primary reconstructions within 1 month. The other four patients were referred to our clinic after failed primary surgeries. Among these four requiring secondary reconstructions, two patients arrived 2 months after their primary surgeries, whereas the other two patients came after more than 1 year.

Four patients had the floor or medial wall reconstructed with a titanium mesh alone, and another two patients had other bony problems corrected in addition. The remaining five patients had a cartilage graft implanted to correct enophthalmos in addition to the reconstruction work.

A comparative group of seven patients treated earlier (between 2006 and 2008) without using a silicone shell served as the control. The operative time and pre- and postoperative symptoms were recorded by reviewing the charts.

3. Surgical techniques

A subciliary or infraorbital incision was made, and then carried deep down by subperiosteal dissection to explore the fracture site. Upper blepharoplasty incision was added if medial orbital wall repair was indicated. An orbitotomy at the infraorbital rim was used to identify the route of the infraorbital nerve, and this step facilitated the freeing of the herniated orbital content from the enwrapped nerve. After thorough release of the herniated contents from entanglement, we tailored a silicone guide with the size and shape resembling those of the defect, but slightly wider on all periphery and inserted it into the orbital cavity to hold up the soft-tissue contents (Fig. 1). A clear operative field with distinct anatomy could be obtained by application of a retractor on this guide, allowing us to dissect the deepest fracture site free of obstacles imposed by the herniated content. The silicone guide was cut out from the suction drain bulb, which had a smooth edge for insetting with safety while also being sturdy enough to withhold the orbital content. Utilizing this technique, we could separate the orbital contents from the fracture site, preventing the orbital contents from reentering the fracture site during the subsequent repair work.

Another copy of silicone guide with exactly the same configuration was produced and taken as reference to formulate the titanium plate (Fig. 2). This plate was fashioned into normal orbit morphology and precisely positioned on the bony platform to restore the continuity of the orbital floor. With its superb pliability and smooth surface character, the silicone guide could be easily drawn out and inset repetitively during the tailoring process.

After placement of the orbital plate, we returned the previously orbitotomized bone back to its original location, and then removed the silicone guide (Fig. 3). A forced duction test was routinely carried out. If necessary, diced cartilage was harvested and instilled into the orbit socket to correct the enophthalmos.

After surgery, potential complications such as visual acuity impairment, extraocular muscle dysfunction, retrobulbar hematoma, infraorbital hypesthesia, or wound infection were monitored and recorded. Surgical results were followed up periodically with exophthalmometer, and computed tomography (CT) scan images were routinely obtained 3 months after surgery in all patients.

4. Results

The patients were followed up for 3—22 months (mean: 8 months). There was no visual impairment, new-onset extraocular movement limitation, or wound infection after surgery. The CT scan revealed that all patients had their mesh placed adequately without incarceration of orbital contents or impingement of vital structures (Fig. 4). All five patients who had preexisting extraocular movement limitation invariably had this problem solved. Almost every patient who had cartilage graft implantation experienced double vision shortly after the operation, but this always resolved within 3 months. All of the seven patients who had diplopia prior to surgery had definite improvement; however, two patients had residual diplopia and needed further