ORIGINAL ARTICLE

Open reduction of nasal bone fractures through an intercartilaginous incision

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Abstract

Conclusion: Open reduction through an intercartilaginous incision was useful for treating delayed-diagnosed nasal bone fractures because it resulted in a successful outcome with minimal complications. Objectives: Nasal bone fractures are generally managed with closed reduction, which is usually inadequate and results in airway obstruction with a delayed diagnosis of nasal bone fracture when bone healing and fibrotic adhesions around the bone fragment have progressed. This study investigated the surgical outcome of open reduction through an intercartilaginous incision for delayed-diagnosis nasal bone fractures. Methods: The study enrolled 18 patients who underwent open reduction through an intercartilaginous incision to correct delayed-diagnosis nasal bone fractures. Three independent otorhinolaryngologists evaluated the outcomes 4–35 months (average 12.7 months) postoperatively as excellent, fair or poor. Results: The time from injury to surgery was 11–39 days (20–39 days in adults and 11–30 days in children). The 18 cases included 16 primary repairs and two revisions. A Kirschner wire was inserted in six (33.3%) patients who had unstable reduced nasal bones. Postoperatively, 15 (83%) patients had excellent results, two (11%) had fair, and one (6%) had a poor outcome. No patient experienced any complication.

Keywords: Delayed diagnosis, airway obstruction

Introduction

The nasal pyramid is composed of thin bones located prominently in the central portion of the face. Consequently, the nasal bones are the most commonly fractured bones in the body. Blunt trauma such as that received from motor vehicle crashes, sports injuries, and physical altercations is the most common cause of nasal fractures. An accurate diagnosis and appropriate surgical intervention are important for managing nasal fractures because a mild abnormality of the nasal bone or cartilage can lead to a prominent external nose deformity and nasal obstruction [1–3].

The management of nasal bone fractures is classified into closed and open reduction. Most are treated with closed reduction because it is simple and easy. If the outcome of a closed reduction is unsatisfactory, open reduction or secondary rhinoplasty should be considered. In some patients who do not undergo reduction within the optimal time (10 days since the trauma) [4], greater bone healing and fibrotic change restrict the reduction and increase the potential need for surgical osteotomies. Therefore, many authors suggest that they undergo a delayed operation at least 6 months after the trauma, when stability has been achieved at the fracture site [4,5].

This study presents our surgical technique for open reduction of delayed-diagnosis nasal bone fractures through an intercartilaginous incision and its outcome.
Material and methods

Patients

This study was approved by the institutional review board of Chuncheon Sacred Heart Hospital. We retrospectively reviewed the medical records of 18 patients (17 males and 1 female) who underwent open reduction through an intercartilaginous incision for delayed-diagnosis nasal bone fractures between August 2001 and February 2008 at the Department of Otolaryngology-Head and Neck Surgery in Chuncheon Sacred Heart Hospital and were available for a medical record review and postoperative facial photographs. Delayed diagnosis was defined as that later than 2 weeks after the trauma for adult patients and after 10 days for children. This procedure was not performed after 3 months from the initial nasal trauma.

The mean patient age was 24.0 years (range 9–45 years) and the mean follow-up was 12.7 months (range 4–35 months). They were diagnosed using 3 mm facial computed tomography (CT). Seventeen patients had only nasal fractures and one patient had an associated maxilla fracture. All preoperative and postoperative photographs were analyzed by three independent otorhinolaryngologists. The postoperative outcomes in terms of successful correction were classified as excellent, fair, or poor.

Surgical technique

After local infiltration at the caudal border of the lower lateral cartilage and nasal dorsum, about 1 cm long intercartilaginous incisions were made bilaterally between the lower and upper lateral cartilages (Figures 1A and 2A). The soft tissue was dissected using iris and converse scissors from the upper lateral cartilage to the caudal border of the fractured nasal bone (Figures 1B and 2B). A Freer’s periosteal elevator was used to elevate the subperiosteal flap, proceeding posteriorly to the fractured nasal bone to detach fibrotic tissue from the fractured bone and free the fractured nasal bone (Figure 1C). The fracture segments were detected easily (Figure 1D). The displaced bone segment was lifted upward and outward with a periosteal elevator (Figure 2C), and accurate reduction of the nasal bone was identified through the incision (Figures 1E and 2D). When the nasal septum was fractured, it was replaced in the midline using Asch forceps. If the reduced nasal bone was unstable, particularly in the presence of anteroposterior collapse requiring rigid internal nasal support [6–8], a 0.035 inch Kirschner wire was inserted manually through the mucosa at the medial side of the caudal border of the lateral cartilage. It passed just above the lateral cartilage, extending to the cephalic nasal bone or the nasal spine of the

Figure 1. The surgical technique of open reduction through an intercartilaginous incision for nasal bone fracture. (A) Approximately 1 cm long intercartilaginous incisions were made bilaterally. (B) Delicate dissection was performed between the upper lateral cartilage and soft tissues. (C) A mucoperiosteal flap was elevated and the fibrotic band near the fracture site was dissected using a Freer’s elevator and retracted with an L-shaped retractor. (D) Fibrotic change and callus formation were observed at the fracture site (arrow). (E) The displaced nasal bone was reduced with a periosteal elevator, and accurate reduction of the nasal bone was identified (arrowhead).
The incisions were sutured with 4-0 polydioxanone (Ethicon, Somerville, NJ, USA). Intranasal packing was inserted to support the bone fragment, which was removed after 3 days; a Denver splint was then applied to protect the nose for 1 week. The Kirschner wires were usually placed for 5–7 days or, in the extremely unstable nose, for 2 weeks.

Results

The period between the initial injury and surgery ranged from 11 to 39 days (mean 16.7 ± 4.2 days): 20–39 days in adults and 11–30 days in children. The most common cause of trauma was sports in seven cases (38.9%), followed by traffic accidents in six cases (33.3%), and falls in five cases (27.8%). Two patients underwent a revision after failure of closed reduction. Eight patients underwent surgery under local anesthesia, while 10 patients had general anesthesia. The concomitant septal fracture was corrected in eight patients. A Kirschner wire was inserted in six patients (33.3%). The operating time ranged from 15 to 30 min. Fifteen patients achieved an excellent cosmetic outcome (Figure 3); two patients had a slight external deformity, but did not require late corrective surgery; and one patient had an unsatisfactory result. No postoperative complication occurred during the follow-up period.

Discussion

The primary treatment goal in the management of nasal fractures is to re-establish the cosmetic appearance of the nose and normal nasal cavity function. The most appropriate timing of treatment, however, is somewhat controversial. Some authors recommend performing the reduction within 10 days of the trauma for adults and within 7 days for children. Bone healing in children may occur more rapidly than in adults. More severe injuries, such as open fractures and injuries with extreme external deformities, require immediate surgery [4,9,10]. Other authors have emphasized the importance of treating nasal bone...
fractures within 2 weeks of the injury because patients treated later are at an increased risk of inability to straighten the nose [11]. In addition, Clark and Stiernberg suggested that early aggressive treatment, such as open reduction, septoplasty, and rhinoplasty, gave a better result than closed reduction when reducing the nasal bone [12]. Generally, if the patient misses the optimal time, they may have to wait several months for the fractured bone to stabilize.

This study presented a surgical technique involving open reduction through an intercartilaginous incision for delayed-diagnosis nasal bone fractures and its successful outcome. Since the delayed-diagnosis nasal bone fracture has already undergone bone healing and the formation of fibrous connective tissue, which hinders anatomic reduction, the fibrous tissue must be removed completely for an accurate reduction. However, in a closed reduction, the intraoperative assessment of bone fragment repositioning is based on palpation and the facial contour only and the removal of connective tissue is impossible. Therefore, an open approach must be considered in such cases.

Our technique has certain advantages. First, the patients found the operative procedure under a combination of topical and local anesthesia very acceptable. Second, bilateral intercartilaginous incisions are simple, provide enough exposure to assess the fracture site, and have a minimal risk of complications. Third, the operations took only 15–30 min. Compared with our technique, in open reduction via an open rhinoplasty incision, the soft tissues of the nose are dissected extensively to expose the nasal bone; a potential risk exists of collapse of the upper lateral cartilage, or deformity by scar contracture and soft tissue swelling; and the operating time increases. In open reduction via a transverse incision on the nasal dorsum, an external scar remains [13].

Conclusion

In this study, open reduction through an intercartilaginous incision was a simple, useful method for managing delayed-diagnosis nasal bone fracture, because our technique has no external scar, offers good exposure of the fracture site, and minimizes complications.

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References