TECHNICAL NOTE

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Intravenous catheter flanges as an external nasal stent: a novel technique

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Abstract (J Korean Assoc Oral Maxillofac Surg 2024;50:116-120)

External nasal splints are commonly used for immobilization following nasal fracture reduction or rhinoplasty procedures. The literature documents the use of various materials like thermoplastic materials, aluminum, Orthoplast, fiberglass, plaster of Paris, and polyvinyl siloxane. These materials are bulky, time-consuming, expensive, and cumbersome to use, and have been associated with complications including contact dermatitis and epidermolysis. Furthermore, they cannot be retained if the situation warrants prolonged stabilization and immobilization. We introduce a new technique using readily available scalp vein catheter flanges as an external nasal stent. The technique is easy to master, inexpensive, and limits edema and ecchymosis, while stabilizing the reconstructed nasal skeleton in position during the healing period.

Key words: Splinting, Rhinoplasty, Nasal bone, Nasal bone deformity

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I. Introduction

Nasal bone fractures are the third most common skeletal fractures and the most common craniofacial fractures owing to their central position and prominence on the face[1], while rhinoplasties are one of the most frequently performed cosmetic procedures. Following these procedures, external nasal splints are frequently used to stabilize, guide, and remodel the nasal skeleton during the healing process[1,2]. It is also believed that these splints reduce the dead space and facilitate close contact of the skin with the underlying bone and cartilage, limiting postoperative ecchymosis and edema. Use of various materials like aluminum, Orthoplast[3], fiberglass[4], plaster of Paris (POP), polyvinyl siloxane[5], and thermoplastic materials as nasal splints including three-dimensional (3D)-printed splints[6] have been documented in the literature. Many of these splints are bulky, time-consuming to fabricate, expensive, cumbersome, and have reported incidences of contact dermatitis and epidermolysis[7]. Moreover, these splints can be maintained only for a short duration and cannot be retained if the situation warrants prolonged stabilization and immobilization. Considering these disadvantages, a new method using scalp vein catheter flanges as an external nasal stent is proposed.

II. Technical Note

Materials used include scalp vein catheters of various sizes (22 and 18 gauges) and 1-0 polypropylene monofilament suture (NW 883, needle dimension: 45 mm 1/2 circle reverse cutting). Flanges are cut separately from the scalp vein catheter. The flanges have one smooth and one rough surface on either side. While positioning, the smooth surface of the flange is placed against the skin to avoid injury.(Fig. 1) After completion of the reconstructive procedure (nasal osteotomy, nasal fracture reduction, or dorsum augmentation), the flanges are positioned bilaterally on the lateral surfaces of the nose. The suture is passed through the flange from one side, continuing trans-cutaneously and beneath the nasal osteotomy on one side and passing transnasally through the septum and beneath the nasal bone on the other side. Once the suture emerges from the other side of the nose, it is passed through the flange positioned on the opposite side and then reversed

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back along a similar path to exit through the flange on the initial side, ultimately akin to a horizontal mattress suture.(Fig. 2) Care should be taken while tightening the suture to avoid excessive compression of skin under the stent, and the force should be just enough to stabilize the underlying tissue. When used following nasal osteotomy or in cases of nasal bone fractures, the transfixing suture passes trans-nasally beneath the bone segments, while the flanges drape the skin over the segments/ graft, resisting both vertical and lateral displacement. Though the flanges provide reasonable stability in routine osteotomies, use of an external splint might be helpful in cases of comminuted nasal bone fractures to prevent direct force on the dorsum during immediate healing.

Various indications for the use of flange stents are as

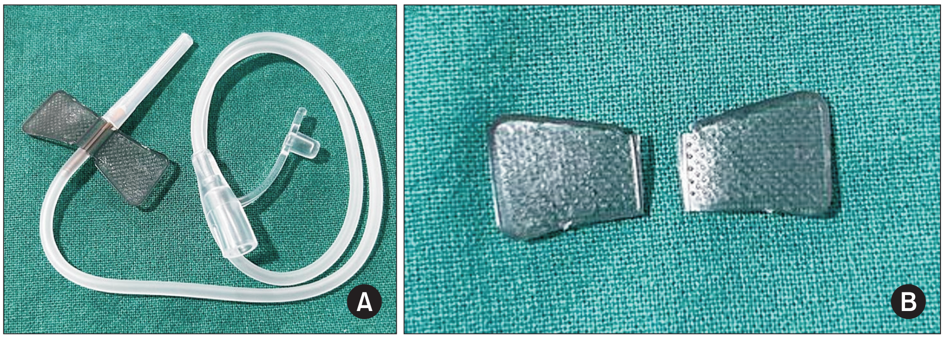

Fig. 1. A. A 22-gauge scalp vein catheter. B. Separated wings of the catheter to be used as a nasal stent.
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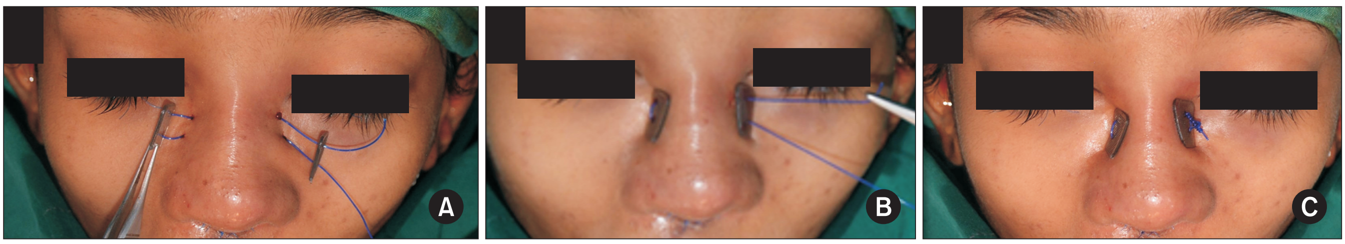

Fig. 2. A. Transnasal passage of the suture from under the nasal bones. B. Nasal stent positioning. C. Nasal stent fixation with tightening of the suture.
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Fig. 3. A. Nasal stent used to position and stabilize the fractured nasal bones. B. Nasal stent used to stabilize the dorsal graft.
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follows.

1. Nasal osteotomy or nasal fracture reduction is performed, and the nasal cartilage and bone are positioned as desired. A 1-0 Prolene suture is used to fix the flanges by passing the suture trans-nasallyunder the nasal bones as shown in Fig. 2 to splint and immobilize the nasal segments. The suture is tightened to maintain the nasal bones in the appropriate position without pressurizing the skin.(Fig. 3. A)
2. During rhinoplasty for nasal dorsum augmentation, these splints hold the skin close to the underlying bone and cartilage, while supporting the dorsal graft.(Fig. 3. B)
3. For cleft rhinoplasty, the depressed lateral and alar cartilages can be mobilized, modified, grafted, and held in the correct position using bolster-like stitches and these stents. As shown in Fig. 4. A, 4. B, multiple stents can be used simultaneously.
4. In hypertelorism or late correction of traumatic telecanthus, the stents help to hold the medial canthal ligaments and surrounding soft tissue against the new bone position and help the soft tissue to heal against its memory. In addition, the amount of soft tissue removal can be more accurately determined after placement of the stents.(Fig. 4. C)

In exceptional cases like medial canthal ligament repositioning, severe nasal bone fractures, or cleft rhinoplasties, the stent can be maintained in position for up to four weeks as the nasal skeleton heals. The purpose of the splint is to hold the graft (like the diced cartilage), reduced fracture segments, or dissected or repositioned fracture segments in position during the initial and extended healing periods. Adequate compression ensures soft tissue adaptation through this period. The applied compression is clinically judged and is similar to the placement of bolster dressings for the ear and nose. The skin

Fig. 4. A. Nasal stent used as a conformer for alar cartilage after closed dissection. B. Multiple nasal stents used for alar and upper lateral cartilage positioning. C. During hypertelorism, it helps hold the medial canthal ligament and the soft tissue against the new bony position.
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underneath the wings must be monitored daily for the first three days and then weekly until removed. Upon removal, temporary markings from the wings may be visible on the skin, but these typically disappear within one week. At home, the patient will maintain hygiene around and under the splint using cotton buds. The stent can be removed easily in the outpatient clinic. Mild skin breakage may be seen in prolonged use of the stent, which heals without leaving a prominent scar.

III. Discussion

Fractured facial bones are typically fixed to prevent their displacement caused by facial and masticatory muscles. However, when the nasal skeleton is traumatized, it often is comminuted under its thin, soft tissue cover and is not amenable to fixation. Consequently, nasal bone fractures are often treated with closed reduction and an external stent for stabilization. Various materials like aluminum, Orthoplast[3], fiberglass[4], POP, polyvinyl siloxane[5], thermoplastic materials, and 3D-printed splints[6] are used as nasal splints. However, each of these materials has limitations. Naik and Naik[8] compared two commonly used materials as nasal external stents (POP and self-adhesive padded aluminum splints) and noted that patients with POP stents found their stent to be bulky and preferred early removal. Aluminum splints were lighter, but the adhesive acted as an irritant. Ahn et al.[4] found that, although Aquaplast and fiberglass splints were equivalent in patient comfort, fiberglass splints were easier to use and required less operative time. Matti and Nicolle[3] used Orthoplast, which requires the availability of hot water for molding and could even cause thermal injury if not handled correctly. Shetty and Vasishta[9] used a self-curing acrylic, which can be customized and adapted onto the nasal skeleton intra-operatively but has drawbacks such as an exothermic reaction during setting and potential irritation from the monomer, which can also leach out and injure the eye if not handled carefully. Jayakumar et al.[5] used polyvinyl siloxane for the same application, proposing it for its ability to register good surface details and being a non-irritant with low curing shrinkage. However that material results in a bulky stent that cannot be maintained for a long time. Erdogan et al.[6] used 3D-printed splints and reported that postoperative edema and ecchymosis were low, and patient recovery was faster as compared to the previously used external nasal stents. However, 3D-printed splints are expensive and require initial planning and printing facilities, which may not always be available.

Using the described technique, catheter flanges can be used to immobilize nasal bones, stabilize additional grafts, and support cartilage. In addition, it prevents dead space and allows the skin to be draped well over bone or graft, limiting hematoma formation and promoting faster healing. These wings are made from polyvinyl chloride, which is extensively used in the manufacturing of medical devices[10]. These materials are devoid of di(2-ethylhexyl) phthalate, and latex, eliminating the potential complications associated with leaching. In addition, the wings are positioned onto intact skin, allowing prolonged use of the materials. The authors have achieved favorable outcomes using this technique for over three years and have not documented any skin reactions. The other advantage of this technique is the availability of the necessary armamentarium. Unlike other splints, there is no exothermic reaction, and the structure is inexpensive, lightweight, and smaller in size. These benefits are expected to improve patient compliance and allow earlier return to routine while the nasal skeleton heals.

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Authors' Contributions

S.A.N. participated in writing the manuscript. P.S. was involved in conception and designing of the article. S.I. final approved the article. A.K. was involved in data collection. All authors read and approved the final manuscript.

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Consent for Publishing Photographs

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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