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## A study on assessing the effectiveness of nasal splinting in nasal bones injury

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### Abstract

**Background:** Nasal bone fractures are common facial injuries requiring effective management to ensure proper healing and cosmetic outcomes. Nasal splinting is widely used in the postoperative care of nasal fractures, but the effectiveness of different splint types, such as plaster of Paris (POP) and aluminium splints, remains to be fully evaluated.

**Materials and Methods:** This retrospective study was conducted at the Department of ENT, GSL Medical College, Rajamahendravaram involving 100 patients with nasal fractures or rhinoplasty. Patients were treated with either POP splints (73 patients) or aluminium splints (21 patients). Data was collected on fracture types, splint duration, patient comfort, clinical outcomes, and satisfaction rates. The follow-up period ranged from 3 to 8 months.

**Results:** Patients treated with aluminium splints reported greater comfort and ease of use compared to those with POP splints, although some experienced skin irritation. POP splints, while bulkier and more cumbersome, provided superior stabilization for displaced and compound fractures. 95.94% of patients expressed overall satisfaction with their outcomes, with 32 requesting early removal of POP splints in favor of aluminium ones.

**Conclusion:** Both POP and aluminium splints effectively managed nasal fractures, but aluminium splints were preferred for comfort and ease of use in non-displaced fractures. POP splints remain valuable for complex fractures requiring more rigid stabilization.

**Keywords:** Nasal fractures, nasal splints, plaster of Paris, aluminium splints, rhinoplasty, patient satisfaction

### Introduction

The nasal septum is composed of both bony and cartilaginous structures, providing support to the nasal cavity. The bony portion consists mainly of the vomer and the perpendicular plate of the ethmoidbone. Additionally, contributions come from the nasal crests of the maxilla and palatine bones, which stabilize the septum<sup>[1]</sup>. The nasal bones, forming the bridge of the nose, are two small, rectangular bones that are commonly subject to fractures due to their prominent position. Fracture mechanisms of nasal bones typically result from direct trauma, such as falls, sports injuries, or assaults. The force applied to the nasal area can cause displacement or comminution of these delicate bones, depending on the direction and intensity of the impact<sup>[1-3]</sup>. Clinically, nasal bone fractures present with symptoms such as pain, swelling, epistaxis (nosebleeds), deformity, and nasal obstruction<sup>[4]</sup>. Physical examination often reveals crepitus and deviation of the nasal bridge. The diagnosis is primarily clinical, but imaging, such as X-rays or CT scans, may be used to confirm the extent of the fracture and any associated injuries<sup>[5]</sup>. Management of nasal fractures often includes the use of nasal splints, which are applied to stabilize the bones during the healing process. Splints may be external or internal<sup>[6]</sup>.

External nasal splints are commonly used to immobilize the nasal bones after closed or open reduction procedures. These splints serve to maintain the corrected position of the bones, prevent displacement, and reduce edema during the healing phase. Several types of external nasal splints are available, such as aluminum, plastic, or thermoplastic splints, which can be custom-molded to the patient's nose. Internal splints, typically made from silicone or other biocompatible materials, are inserted into the nasal cavity to support internal structures post-surgery or fracture<sup>[7, 8]</sup>.

External nasal splints are often preferred for their ease of application, minimal invasiveness, and the ability to stabilize the nose externally without interfering with internal nasal structures<sup>[8]</sup>.

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The aim of this study is to evaluate the effectiveness of external nasal splints for nasal bone fractures in maintaining bone alignment and promoting optimal healing.

### Materials and Methods

This retrospective observational study was conducted in the Department of ENT to evaluate the effectiveness of nasal splinting in the management of nasal bone fractures. The study was conducted over a period of 1 year, i.e. from March 2014 to February 2015. A total of 100 patients who had undergone rhinoplasty but secondary to nasal fractures and/or want to undergo cosmetic correction nasal surgery rhinoplasty, at a tertiary care hospital were included. The inclusion criteria were patients aged 18-60 years with isolated, non-compound nasal bone fractures, confirmed by clinical examination and radiographic imaging. Patients with comorbid facial fractures or previous nasal surgeries were excluded.

For patients with nasal fractures a detailed history, including information on the mode of injury, any previous injury or previous nasal deformity, and the presence of post-trauma airway obstruction were recorded in detail.

The primary outcomes were nasal bone alignment, patient satisfaction and functional outcomes which were measured using clinical examinations, patient questionnaires and nasal patency tests. Secondary outcomes included complication rates such as skin irritation, splint discomfort, and nasal deformities. Data were analyzed using SPSS software, with statistical significance set at  $p < 0.05$ .

### Results

The study included a total of 100 patients, 71 males (71%) and 23 females (23%), with ages ranging from 18 to 54 years (mean age of 24.2 years). The patients were divided into two groups based on the type of splints used: 70 patients were treated with plaster of Paris (POP) splints, while 30 were treated with self-adhesive padded aluminium splints.

Of the 100 cases, 60 had displaced nasal fractures, and among these, 15 also had external wounds with compound fractures, necessitating the use of POP splints after reduction and wound repair. POP splints were also used in four patients who underwent external rhinoplasty.

In contrast, aluminium splints were used in 23 patients with non-displaced fractures and in 7 cases of internal augmentation rhinoplasties. The fractures were initially assessed using clinical examination, X-rays, and CT scans. Fracture reduction was performed within 24 hours for 57 patients, while the remaining 23 patients underwent reduction within 2 to 4 days after allowing edema to subside.

For the procedure, local anesthesia was used in most cases, and general anesthesia was administered to 20 patients. The POP splints were molded and applied to the reduced nasal bones, remaining in place for 24 days, while aluminium splints were kept for 2-3 weeks. POP splints were reported to be bulkier and more cumbersome, with 30 patients requesting their removal after 7 days, after which they were replaced by less bulky aluminium splints. On the other hand, patients with aluminium splints noted skin irritation due to the adhesive, but appreciated their lightweight and less conspicuous nature.

### Discussion

The study aimed to compare the effectiveness of plaster of Paris (POP) and self-adhesive padded aluminium nasal splints in the management of nasal fractures and rhinoplasty patients. Results from our study showed that both types of splints were effective in maintaining nasal bone alignment during the

healing process. However, patient satisfaction and comfort varied significantly between the two.

The POP splints, though effective, were reported as bulky and cumbersome by most patients, with 32 of them requesting early removal. In contrast, aluminium splints, while lighter and less obtrusive, caused skin irritation due to the adhesive. This aligns with previous findings by Ardekian *et al.* [9], who also reported higher comfort levels with aluminium splints but noted issues related to skin reactions in a subset of patients.

Murray *et al.* [10], who emphasized that while POP provides robust stabilization, it can interfere with daily activities and is generally less tolerated by patients over long periods.

Our study found that 95.94% of patients expressed satisfaction with their clinical outcomes, which is comparable to the results reported by Gassner *et al.* [11], where patient satisfaction exceeded 90% regardless of the type of splint used. This high rate of satisfaction can be attributed to proper fracture reduction techniques, which ensure optimal healing regardless of splint type. However, the preference for aluminium splints in terms of aesthetics and ease of use further supports the argument by Ramirez *et al.* [12], who suggest that the less invasive nature and inconspicuous appearance of aluminium splints make them a preferred choice for patients concerned with appearance during the healing phase.

The differences in patient preference between POP and aluminium splints may be due to the physical properties of the materials. POP is known for its superior rigidity, which is crucial for complex fractures or cases requiring long-term stabilization, as observed in external rhinoplasties or compound fractures. Aluminium splints, while less rigid, offer sufficient stabilization for non-displaced fractures and augmentations, as reported by Reilly *et al.*, who advocate their use in cases where minimal movement is expected post-reduction.

### Conclusion

Both POP and aluminium splints offer effective stabilization for nasal fractures, but patient comfort and ease of application favor aluminium splints, especially for non-displaced fractures. Future studies could further explore skin-compatible alternatives to aluminium adhesive to reduce irritation while maintaining its advantages of lightness and aesthetic appeal.

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**Conflicts of interest:** None.

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