

Intranasal Splints using Empty Intravenous Fluid Bottles, Effectiveness and Morbidity

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Abstract

Objective: The study was carried out to evaluate the effect of customized intranasal splints taken from consumed I.V fluids bottles after septoplasty procedures, in terms of patient's tolerance, preventing post-operative adhesions and associated morbidity.

Design: This is a prospective study at a regional referral hospital between 2010 and 2014 in patients who underwent septoplasty procedure without any other nasal surgery. Consumed I.V fluid bottle, after sterilization, were inserted in randomly selected patients after surgery. No nasal packs were used and the splints were removed on 7th post-operative day in the clinic without anesthesia.

Methods: Sixty adult patients who underwent pure septoplasty procedure, at King Abdullah University Hospital, were randomly categorized into two equal groups, one with and the other without INS. None of the patients had nasal packing. The plastic wall of an empty I.V fluid bottle was used as INS, which is cheap and easy to cut in different sizes.

Post-operative pain was evaluated by using visual analogue scale at day one. At day 7, pain and discomfort after nasal splint removal and nasal cleaning were compared with nasal cleaning and suctioning of the non-splinted group. Six weeks later, patients were evaluated for symptomatic improvement, septum stability, and the possible complications.

Results: Our study showed that intranasal splints using an empty intravenous bottle is safe, well tolerated, cheap and has significantly decreased the risk of adhesions, without increasing risk of septal hematoma, infection or perforation. However, it had significantly increased pain and nasal discomfort during removal one week after surgery.

Keywords: Intranasal splints (INS), Septoplasty, Nasal adhesions, septal hematoma, Hyposmia.

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Introduction

Since its introduction by Salinger and Cohn in the mid-1950s The Intranasal Splint (INS),⁽¹⁾ is one of the common prosthesis used by

otolaryngologist today. Several types of materials have been used in the past, such as strips of x-ray film, and the polyethylene tops of coffee cans⁽²⁾⁽³⁾. The rationale for this is to prevent postoperative adhesion⁽²⁾, to hold the

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septum in corrected place⁽¹⁾ and to prevent septal hematoma⁽³⁾. However, subsequent studies have cast considerable doubt on the effectiveness and efficacy of intranasal splints and have also identified an apparent increase in morbidity associated with their use^(4,5,6). Since their wide use, many prospective and retrospective studies justified or discouraged their use. This study was carried out to review the safety and efficacy as well as morbidity of using the plastic wall of empty intravenous fluid bottles as intranasal splints.

Methods:

Five hundred patients attending ENT service at King Abdullah University Hospital (KAUH), who were on the waiting list for nasal surgery were evaluated. All of them were supposed to have septal surgery with or without other nasal procedure. Patients who underwent septal surgery with other procedures were excluded. Sixty patients who underwent septoplasty alone by the end of the procedure and then divided randomly into two groups (splinted 30 patients

and non-splinted 30 patients). Symptoms (nasal obstruction, congestion, rhinorrhea, hyposmia, headache) were evaluated by Visual Analogue Scale (VAS) (0-100mm) preoperatively, and postoperatively.

Pain during removal of splints and pain during cleaning of non-splinted group also were assessed on (VAS) (0-100mm). Post-operative outcome regarding the straightness of the septum and the complications were compared between two groups.

Standardised preparation of the nose with xylometazolin solution was used in all cases, septoplasty was performed depending on the configuration of the nasal septum, Surgery and follow-up were done by the same surgeon, After decongestion, 1% lidocaine with 1:100,000 epinephrine was injected into the deviated septum to aid with hydro-dissection as well as hemostasis, using the classical hemitransfixation incision with a combination of sharp and blunt dissection, a mucoperichondrial flap was elevated to the bony-cartilaginous junction on both sides.



Figure 1: Customized empty intravenous fluid bottles used as intranasal splints

The septal cartilage was then disarticulated from the perpendicular plate of the ethmoid and vomer. Then we carefully removed the deviated

part of the nasal septum and part of the perpendicular plate of the ethmoid and some tissue of the vomer. After correction of the septal

deviation, closure of the hemitransfixation incision was performed using an interrupted 4-0 vicryl. Care was taken during mucoperichondrial flap elevation to avoid any mucosal tear. In the splinted patients, customized splints using an empty intravenous fluid bottle was used (Figure 1), a 3-0 vicryl suture was used to fix the splint trans-septally. The splints were coated with antibiotic cream before insertion.

All patients were seen after one week for either removal of splints or nasal suction and toilet. All patients were also seen at 6 weeks and evaluated for the straightness of the nasal septum and post-operative complications. All patients were called and interviewed and evaluated using VAS not less than four months after the surgery. The study was approved by the Committee on Human Experimentation at KAUH. Statistical analysis of the results was carried out using both the excel Microsoft program and paired Student t test.

Results:

Sixty consecutive patients underwent septoplasty in division of otorhinolaryngology - head and neck surgery were recruited for the study. Medications were prescribed for all the patients to alleviate nasal obstruction but with poor response. All preoperative symptoms, operative notes and postoperative follow up were recorded. Follow up data from all sixty patients (45 men and 15 women) were available for evaluation (mean 28 months) (range 4-44 months). The mean age of patients at presentation was 28.05 years (range 11- 69 years). The mean duration of history of nasal obstruction was 6 years (range 0.5- 18 years). The subjective symptoms VAS scores, frequencies of nasal symptoms are shown in Table 1.

Thirty patients (25 men and 5 women), mean age was 29.7 years (range 20-69 years),

underwent septoplasty with a hemitransfixation incision for a more caudal septal deviation without insertion of the nasal splints, Thirty patients (20 men and 10 women), mean age was 26.3 years (range 11-43 years) required septoplasty with insertion of nasal splints using an empty intravenous fluid bottles, which is available in the operating room, in order to maintain the stability of the nasal septum and to decrease possible complications (septal hematoma due to bleeding during surgery, or septal perforation as a result of tear during flap elevation, or extensive resection of the cartilage).

All patients stayed overnight in the hospital and discharged next day.

Elven patients reported complications after surgery, one reported nasal deformity after septoplasty with splints, the other 10 patients did not have splint and had unilateral intranasal adhesion (n=5), septal hematoma (n=2), and septal perforation at last follow up (n=3). As shown in Table 2.

Table 3 shows a comparison between the scores of preoperative and postoperative subjective symptoms in the two groups of patients.

Nasal obstruction at last follow up were on average 68.6% of preoperative values. Table 3 shows a comparison between the scores of preoperative and postoperative subjective symptoms in the two groups of patients. At the last follow up sixteen patients (26.5%) reported complete relief of nasal obstruction. Four patients (6.6%) had the same degree of nasal obstruction as before surgery. Two patients (3.3%) had their nasal obstruction VAS was worse than before surgery. At the last follow up, the mean nasal obstruction VAS score and other symptom scores of patients showed a significant reduction from the mean preoperative values ($P < 0.005$ for all paired t test).

Table 1. Preoperative Subjective Symptom scores (n=60)

<i>Preoperative Measure</i>	<i>Average (Mean)</i>	<i>SD</i>	<i>Range</i>
Nasal Obstruction, VAS mm	65.3	21	0-100
Headache, d/m	10.23	9.72	0-30
Congestion, VAS mm	51	31.8	0-100
Epistaxis, VAS mm	9	19.1	0-100
Hyposmia, d/m	13.5	11.07	0-30
Nasal Pain, VAS mm	48.3	37	0-100

Table 2. Post-operative Complications

Complications	Splints	Non-splints
Septal hematoma	--	2 (6.6%)
Septal perforation	--	3 (10%)
Saddle deformity	1 (3.3%)	--
Adhesions	--	5 (16.6%)

Table 3. Comparison between subjective symptom of preoperative and postoperative

<i>Symptom</i>	<i>Mean VAS in splinted (n=30)</i>			<i>Mean VAS in non-splinted (n=30)</i>		
	<i>Preoperative</i>	<i>Postoperative</i>	<i>P-value</i>	<i>Preoperative</i>	<i>Postoperative</i>	<i>P-value</i>
Nasal Obstruction, mm	68.6	21.6	<0.001	62	20.3	<0.001
Headache, d/m	11.1	4.05	0.0001	9.39	3.48	<0.003
Congestion, mm	51	21.2	<0.005	51	19	<0.001
Hyposmia, d/m	13.38	3.18	<0.001	13.98	5.58	0.0002
Nasal Pain, VAS mm	--	48.3	--	--	18.2	--

Discussion:

Since its introduction 54 years ago⁽¹⁾, intranasal splints have become, after ventilation tubes, the most frequently used prostheses in Otolaryngology⁽³⁾. The use of INS was advocated in the early 1970's after Foxen in 1971⁽⁷⁾ and Gilchrist in 1974⁽⁸⁾ suggested that splints were effective in preventing intranasal adhesions especially in bilateral wall procedures. Many ENT surgeons still use INS in nasal surgery, the pre-shaped silicone rubber splints are by far the most frequently used type, which are available in the market. Using the x ray films were also described⁽¹⁾⁽¹¹⁾. In our study, we used soft plastic material of intravenous fluid bottles as intranasal splints.

Although there is no scientific evidence of their effectiveness to decrease post operative complications or keep the corrected septum stable and straight⁽³⁾. The use of splints with their associated disadvantages (risk of displacement, discomfort, increased crusting, secondary infection, painful removal) is not easy to justify without objective evidence as to their effectiveness⁽⁹⁾. In the 1970s and 1980s, there were advocates to use INS to prevent intranasal adhesions, especially in both of sides surgeries (septum and lateral wall)^(10, 2,8). In this study 5 out 30 (16.6%) patients having non-splinted septoplasty developed postoperative adhesions. Meanwhile, there was no intranasal adhesions in the splinted group.

Von Schoenberg et al reported that rate of adhesions was 7.5% one week postoperatively⁽⁶⁾. He reported also that the adhesion rate at 3 months was 2.1% because of careful nasal toilet in one week⁽⁶⁾. In our study, careful nasal toilet one week postoperatively, was performed in the clinic regularly for all patients. This had played an important role in the prevention of postoperative nasal adhesion.

Pain and soreness that accompanies INS is a well-known association⁽³⁾. This can be suffered while the splint is in its place, or when it is removed. The score of pain in our study is 48.3%, which is in agreement with other studies^(3,4). Malki et al reported a significant increase in pain and soreness as associated morbidity with using splints and they also observed considerable morbid anxiety developing in patients in anticipation of splint removal⁽⁴⁾. Straightness of the septum is one purpose of using INS^(1,3). Regarding stability of the nasal septum, Cook et al, in a study on 100 patients found no difference between the splinted and non splinted group⁽⁵⁾. This seems to agree with our result (83% and 80%) in splinted and non-splinted groups, respectively.

Conclusions:

We conclude that using empty intravenous fluid bottles sheets as paraseptal splint is easy, safe, well tolerated and has significantly decreased the risk of adhesions, without increasing risk of complications such as septal

hematoma, infection or perforation. However, it had significantly increased the pain and nasal discomfort during removing them one week after surgery

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دراسة استخدام الأغشية البلاستيكية للمحاليل الوريدية كجبرة أنفية، الفعالية والمراضة

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الملخص

أهداف الدراسة: أجريت هذه الدراسة لتقييم فاعلية استخدام الاغشية البلاستيكية للمحاليل الوريدية كجبرات داخلية في عمليات تعديل الحاجز الأنفي لمنع الالتصاقات والمضاعفات الأخرى.

تصميم الدراسة: أجريت الدراسة في مستشفى تحويلي خلال الفترة بين 2010 و2014 على المرضى الذين خضعوا لعمليات تعديل الحاجز الأنفي دون أي تداخلات أخرى. استخدمت جبائر أغشية المحاليل الوريدية على مرضى تم انتقاؤهم بطريقة عشوائية دون سابق تحديد. لم تستخدم أي حشوات أنفية بعد العملية. الجبائر أزيلت في اليوم السابع لإجراء العملية في العيادة دون تحديد.

طريقة الدراسة: ستون مريضاً ممن أجري لهم تعديل الحاجز الأنفي قسموا بالتساوي إلى مجموعتين الأولى استخدم فيها جبائر أغشية المحاليل الوريدية والأخرى لم تستخدم بها. في كلا المجموعتين لم تستخدم الحشوات الأنفية. استخدم هذه المادة تم لرخص ثمنها وسهولة قصها لأشكال وأحجام مختلفة.

تم قياس الألم بعد العملية معتمدين مقياس علمي موحد في اليوم الأول والسابع لإجراء العملية والسؤال عن المضايقة خلال تنظيف الأنف وعند إزالة الجبائر. بعد ستة أسابيع تم سؤال المرضى عن الأعراض والمضاعفات التي قد تنجم عن العملية.

النتائج: وجدنا أن استخدام هذه الجبائر آمن ومحتمل لدى المرضى وإحصائياً مفيد لتقليل الالتصاقات بالرغم من رخص ثمنها دون زيادة احتمالية المضاعفات الأخرى مثل التهابات والتجمع الدموي أو ثقب الوتيرة. لكن لوحظ وجود زيادة الشعور بالألم عند إزالة الجبائر في اليوم السابع.

الكلمات الدالة: الجبائر الأنفية، تصحيح وتيرة الأنف، الالتصاقات، ورم دموي، نقص الشم.