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The one-stage rhinoplasty septal perforation repair

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Abstract
A combined septal perforation repair and rhinoplasty was performed in 20 patients (12 males, eight females; age range 16–36, mean age 29.6) presenting with septal perforations (size 1–4 cm) and external nasal deformities. The external rhinoplasty approach was used for all cases and the perforation was repaired using bilateral intranasal mucosal advancement flaps with a connective tissue interposition graft in between. The perforation was totally closed in 18 cases (90 per cent) with complete resolution of the pre-operative symptoms occurring in 16 (80 per cent). Cosmetically, 19 cases (95 per cent) were very satisfied with their aesthetic result. The exposure provided by the external approach proved to be very helpful in the process of septal perforation repair. Our results show that septal perforation repair could safely be combined with rhinoplasty and that some of the rhinoplasty manoeuvres used could even facilitate the process of septal perforation repair.

Key words: Nasal septum; Fistula; Surgery, operative

Introduction

Septal perforations are anatomical defects of the nasal septum that may be traumatic, pathological, chemical, or idiopathic in origin. The traumatic septal perforations which comprise the vast majority of the cases usually occur as a complication of septal surgery, tight nasal packing, aggressive cautery for epistaxis, or nose picking (Belmont, 1985; Goldsmith, 1992).

Nasal septal perforations may cause both functional as well as cosmetic problems. Functional problems result from disturbance of the normal mucociliary clearance mechanism that leads to mucus stagnation and chronic nasal obstruction. Additionally, the turbulence created by the abnormal airflow through the perforation may lead to whistling in small perforations and to excessive dryness, crusting, and bleeding in larger perforations. The more anterior the perforation is the more symptomatic it becomes and the more likely it is for the patient to seek evaluation and treatment.

On the other hand, cosmetic problems associated with septal perforations are due to the loss of the structural support of the nasal septum leading to external nasal deformities, the commonest of which are dorsal saddling and columellar retraction.

The major goal in septal perforation surgery is not only to repair the perforation but also to restore normal form and function to the nose. Multiple surgical methods for perforation repair have been described, but a review of literature by Younger and Blokmanis (1985) showed that the most successful outcomes were reported in cases in which sliding, bilateral mucosal flaps are advanced, and a connective tissue graft is interposed between the repaired mucosal flaps. Fairbanks and Chen (1970) advocated this technique successfully through a closed intranasal approach. Kratz (1973) used an alotomy for added exposure in cases with more posteriorly located perforations. Later, Strelzow and Goodman (1978) reported using the same repair technique through an open external rhinoplasty approach. The increased surgical exposure provided by the open approach not only facilitates the repair of large and posteriorly located perforations but also allows simultaneous rhinoplasty to be performed in cases with associated external nasal deformities.

Materials and methods

The study was conducted on 20 patients in which septal perforations and external nasal deformities coexisted. Each case was subjected to (1) full history taking, stressing the cause of septal perforation and symptoms related to the perforation; (2) external nasal examination to analyse the associated external nasal deformities; (3) nasal endoscopic examination stressing site and size of the perforation, condition of turbinates and the remaining parts of the septum, and any associated intranasal pathology; (4) photographic documentation using endoscopic

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photography for the perforation and the standard rhinoplasty views for the external nose; (5) routine pre-operative investigations were performed for all patients. Only patients with no definite aetiology of their septal perforation were subjected to further screening tests including chest X-ray, ESR, urine analysis, tuberculin test, blood serology for syphilis, computed tomography (CT) scan of nose and sinuses, or finally biopsy from the edge of perforation.

Nasal preparation

To give the patient his best chances for a successful surgical repair the repair should be attempted only when the nasal mucosa is in a healthy condition with no evidence of infection. Accordingly, cases presenting with marked crusting or inflammation of the nasal mucosa were put on saline irrigations and emollients. If the condition persists or chronic nasal discharge was found, a short course of systemic antibiotics was started after culture and sensitivity.

Surgical technique

With the patient in the supine position and after an adequate level of general endotracheal anaesthesia was obtained, the nose and septum were infiltrated with 1% xylocaine and 1:100:000 units of epinephrine. Time is allowed to elapse for the vasoconstrictive and anaesthetic effect of the infiltrated solution while the patient is prepped and draped in the usual sterile fashion. Careful intranasal examination is done and any intranasal synaechia or hypertrophied inferior turbinates are dealt with at this stage.

A classical external rhinoplasty approach is performed where bilateral alar marginal incisions are started laterally along the caudal edge of the lateral crus, dissection is continued medially down the length of the columella where they are connected via an inverted V-shaped transcolumellar incision. The columellar skin is elevated off the medial crura and skin dissection is continued upwards in the supraperichondrial avascular plane till reaching the nasal bones where the periosteum is elevated using a Joseph-type periosteal elevator. Dissection is performed between the medial crura to gain access to the caudal septal cartilage followed by bilateral caudal septal membrane elevation in a strict submucoperichondrial plane. Septal flap dissection is continued upwards till reaching the cartilaginous edge of the perforation where an increased resistance is met during the dissection due to adherence of the septal flaps to each other with no intervening cartilage. At this stage the dissection is taken downwards to elevate the mucosa off the maxillary crest, nasal floor, and laterally until reaching the root of the inferior turbinate where a back cut is made with a #15 blade (Fig. 1A, incision: 1) thus developing a bipedicled floor flap. This flap could be mobilized medially and upwards on both sides of the nasal septum to close the mucosal perforation on each side. The septal flap elevation is continued dorsally between the superior edge of the perforation and the upper lateral cartilage. The upper lateral cartilage is then separated from the septum extramucosally using a #15 blade. The roof flap which now bridges between the superior edge of the perforation and the undersurface of the upper lateral cartilage could be dropped downwards to close the mucosal rent on each side. In cases with large perforations, more length could be added to the roof flap by extending the dissection to include the mucoperichondrium of the undersurface of the upper lateral cartilage. In rare very large perforations, a back cut could be made in the mucosa under the upper lateral cartilage (Fig. 1A, incision: 3), thus transforming the roof flap into a bipedicled flap allowing more downwards advancement.

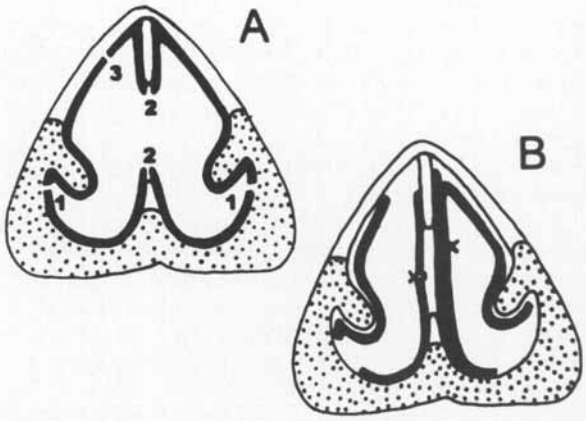


FIG. 1

Schematic diagram of the septal perforation repair technique. A: The sites of mucosal incisions used to create the bipedicled flaps; 1. Below the root of inferior turbinate; 2. At the edge of the septal perforation; 3. On the undersurface of the upper lateral cartilage. B: Advancement of the created flaps with suturing of the mucosal perforation. The connective tissue graft (stripped) can be seen interposed between the repaired flaps.

Only after completing the roof and floor flaps is the mucosal perforation separated using sharp dissection (Fig. 1A, incision: 2) and its edges refreshed. The created flaps are advanced and the mucosal perforation on each side is closed, under no tension, using 5/0 chromic interrupted sutures. Finally, a connective tissue graft (temporalis fascia autograft or dermal allograft) is interposed between the repaired flaps and fixed by sutures to the dorsal and caudal septal cartilage to prevent its migration. The graft used should be large enough to extend circumferentially beyond the suture line of the repaired mucosal perforations of both flaps. The repaired flaps are then mattressed together along with the interposed graft to obliterate the dead spaces and to reinforce the repair. Before reattaching the upper lateral cartilages to the septum, any necessary hump reduction is performed as well as medial and lateral osteotomies if needed. The upper laterals are then re-attached to the dorsal cartilaginous septum using 6/0 PDS sutures in a horizontal mattress fashion. A columellar strut is usually

needed to make up for the loss of tip support following the separation of medial crura from each other as well as from the caudal septum. Despite the perforation, there is usually enough septal cartilage from which to fashion a strut. The strut is inserted in a pocket between the medial crura and fixed in place using 5/0 PDS sutures.

At completion of the rhinoplasty part of the procedure, the nasal skin is returned to its normal anatomical position and the external rhinoplasty incisions are closed. The transcolumellar incision is closed using a deep 6/0 PDS suture to take the tension off the skin edges, which are then approximated with interrupted 6/0 Prolene sutures. The marginal incisions are approximated using interrupted 5/0 chromic sutures.

To protect the repaired septal flaps during their healing phase a silastic sheet of 0.02 inch thickness is fashioned and placed on each side of the nasal septum to cover the whole septum and floor of the nasal cavity. The septal splints are secured in place using three 4/0 Prolene through and through sutures and the nose packed with gelfoam soaked with gentamycin cream. Routine external nasal taping and splinting is then performed.

Post-operative care

The gelfoam packing is suctioned out gradually over the first post-operative week, aided by the patient's use of intranasal saline drops and antibiotic ointment. The external splint is removed at five to seven days after the procedure and the septal silastic sheeting is removed when the mucosal healing is completed, usually two to three weeks post-operatively. The patient will continue the intranasal ointment application for another three weeks. No smoking or nose blowing is allowed during the first three months after surgery.

Results

Out of the 20 cases included in this study 12 were males (60 per cent) and eight females (40 per cent). Their ages ranged from 16-36 years with a mean age of 29.6 years. Five (25 per cent) of the cases had one or more previous unsuccessful attempts at septal perforation repair. The mean post-operative follow-up period was 10 months (range six to 36 months).

The cause of septal perforation was iatrogenic in 16 (80 per cent), occupational in three (15 per cent), and pathological in one (five per cent) case. Thirteen of the iatrogenic perforations followed septal surgery and three followed repeated cautery for epistaxis. Out of the three occupational perforations two were chromate workers and the third was associated with lead exposure. The only case of pathological perforation in this study resulted from a neglected septal abscess. The size of septal perforations ranged from 1–4 cm with nine cases between 1–2 cm, seven cases between 2–3 cm and four cases between 3–4 cm.

The commonest presenting symptom related to the septal perforation was crusting which occurred in 17 cases (85 per cent) followed by nasal obstruction in 12 cases (60 per cent) and recurrent epistaxis in eight cases (40 per cent). Other less common symptoms included recurrent infections of nose and sinuses, headache, and halitosis.

Cosmetically all the 20 cases included in the study had external nasal deformities associated with their septal perforations. Ten cases had deformities related to the septal perforation (Figure 2C) as dorsal saddling, tip drop, or retracted columella. The other 10 cases had incidental deformities unrelated to the septal perforation (Figure 3C) as dorsal hump, crooked nose, bulbous tip, or tip asymmetries.

Surgical outcome

The perforation was totally closed in 18 cases (90 per cent) and only two cases were left with a 0.5 cm residual perforation. These two cases had a 4 cm iatrogenic perforation with more than one unsuccessful attempt at surgical closure.

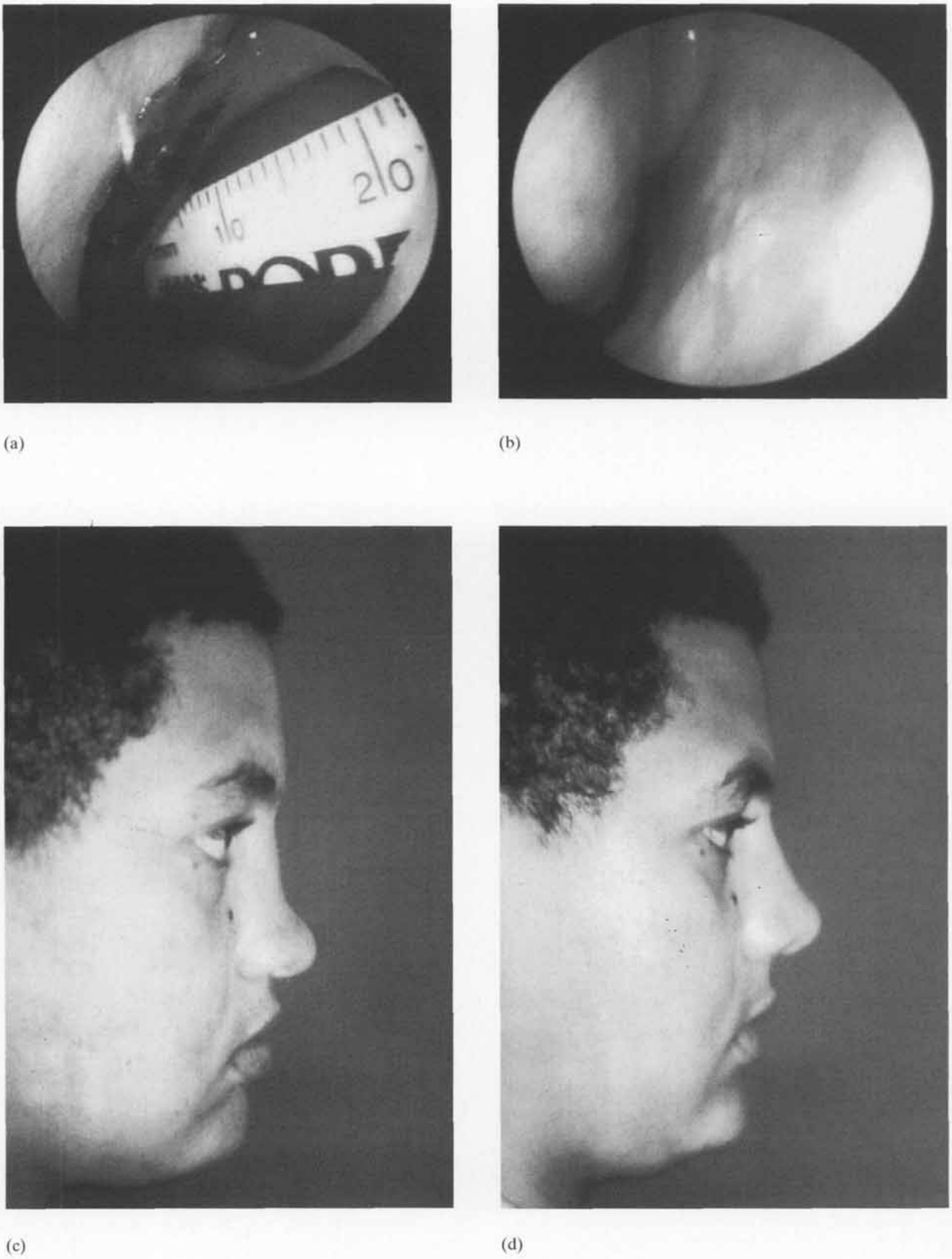
The symptoms related to the septal perforation were totally reversed in 16 cases (80 per cent), the remaining four cases (20 per cent) showed only partial improvement with some residual nasal dryness and crusting but to a much lesser extent. Cosmetically, 19 cases (95 per cent) were very satisfied with their aesthetic improvement and one case complained of dorsal irregularity, which required a minor revision a year later.

Discussion

Multiple surgical techniques have been described for closure of septal perforations with variable rates of success. The most successful techniques have used bilateral intranasal mucosal advancement flaps (Younger and Blokmanis, 1985). This method of repair is technically difficult and needs an adequate surgical exposure to allow for flaps undermining, advancement, and repair to be accurately performed.

In the late 1970s the external rhinoplasty approach was successfully used for the repair of septal perforations (Strelzow and Goodman, 1978). This approach not only provided the needed exposure for large and posteriorly located perforations but also allowed corrective rhinoplasty to be performed simultaneously in cases with associated external nasal deformities.

Technically, the exposure provided by the external approach helped in performing surgical manoeuvres, which were extremely difficult or virtually impossible to perform by the intranasal approach. As an example, in cases in which the caudal septal cartilage was previously resected, the external approach allows the surgeon to access the septum from the dorsal aspect where proper dissection planes could still be found instead of caudally where fibrosis often obliterates the dissection planes. This dorsal access to the nasal septum also facilitates the dissection of flaps posterior to the perforation. Additionally, in cases with large perforations the exposure provided by the external approach allows the dissection and advancement of the mucosa lining the undersurface of the upper lateral cartilage which is technically impossible with the endonasal approach. Finally, at



(a) (b)

(c) (d)

FIG. 2

A 20 years old patient with a huge (3 cms) septal perforation and secondary dorsal saddling before (A, C) and six months after having a one-stage rhinoplasty and septal perforation repair (B, D)

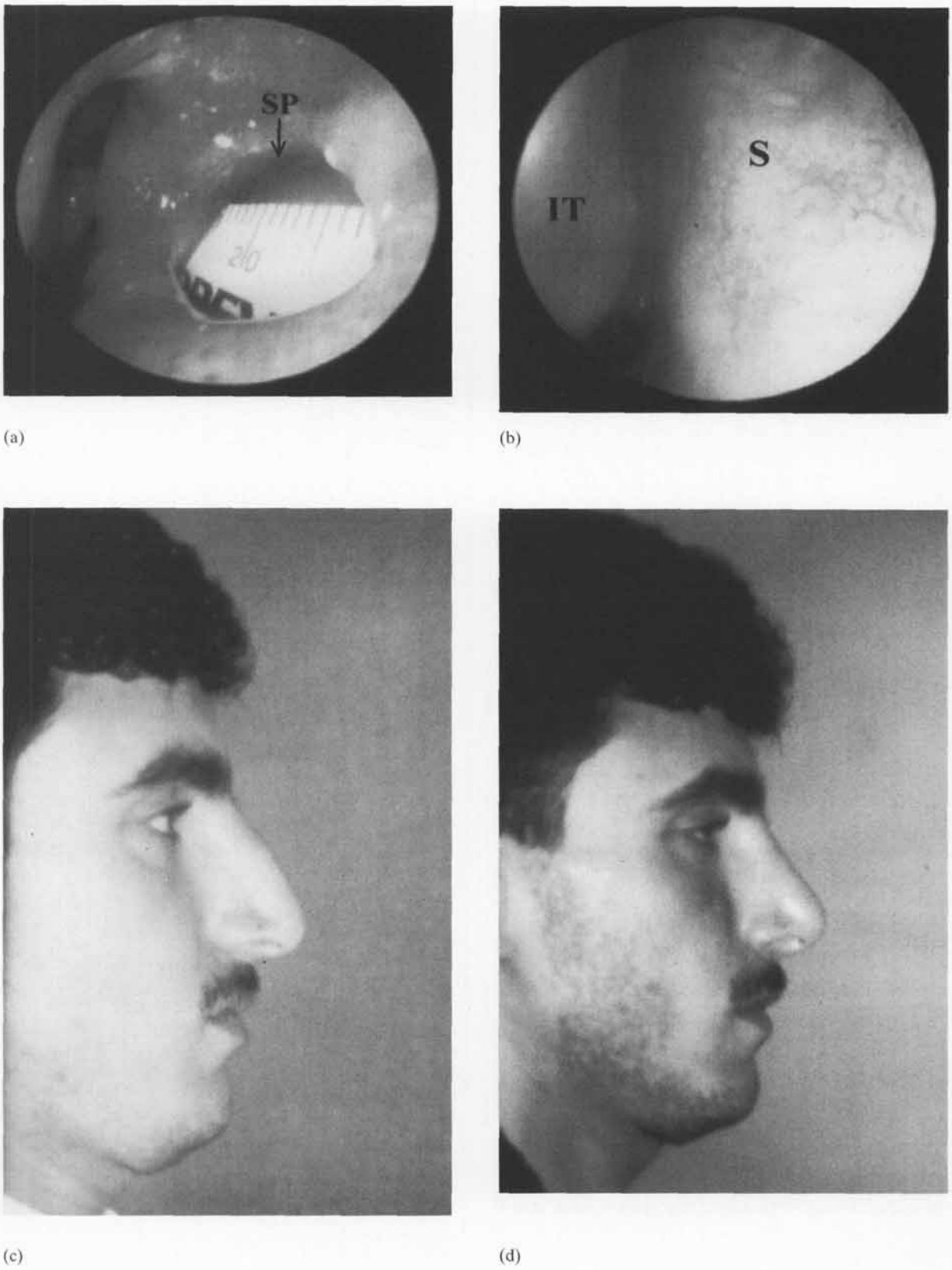


FIG. 3

A, C: Pre-operative views of a 29-year-old patient presenting with a 2 cms septal perforation and a large nose with convex dorsum and overprojecting nasal tip. B, D: One-year post-operative views of the same patient after combining septal perforation repair with a reduction rhinoplasty. (SP: Septal perforation, S: Septum, IT: Inferior turbinate)

the point of suturing the mucosal rent in the septal flaps, the external approach allows the surgeon to work from both sides of the flap, through the nasal cavity caudally and the septal space dorsally, which gives a better chance for complete closure of the perforation.

In the current study combining rhinoplasty with septal perforation repair did not compromise the perforation repair. On the contrary, some of the rhinoplasty manoeuvres used proved to be very helpful in the process of septal perforation repair. The bilateral cephalic trim of the lateral crura, which is performed to narrow the supratip lobule, helps in increasing the surgical exposure to the dorsal cartilaginous septum.

In cases of large or posteriorly located perforations, performing medial osteotomies followed by lateral traction of the nasal bone and upper lateral cartilage allows mucosal flap elevation to be continued both superior and posterior to the perforation. After separating the upper lateral cartilages from the septum, lowering of the nasal dorsum will allow the upper lateral cartilages to be reattached to the nasal septum at a lower level, thus providing more mucosal redundancy to complete the perforation closure under no tension. In some cases of large perforations, even in the absence of dorsal hump, dorsal lowering can still be performed with reattachment of upper lateral cartilages at a lower level followed by dorsal augmentation using a dorsal onlay graft.

On reviewing the literature, the highest success rates in septal perforation closure were all associated with the use of bilateral mucosal advancement flaps together with a connective tissue interposition graft. Using this method of septal perforation repair, many authors reported closure rates between 80–90 per cent (Fairbanks and Chen, 1970; Goodman and Strelzow, 1982; Younger and Blokmanis, 1985; Kridel *et al.*, 1986; Arnstein and Berke, 1989). Fairbanks (1980) reported an exceptionally high success rate of 95 per cent but only in cases with perforations less than 3 cm in diameter.

In the current study, complete closure of septal perforation was achieved in 90 per cent of the cases (18 out of 20). The two cases that were left with a small residual perforation had an initial perforation of 4 cm in diameter and both had more than one previous unsuccessful attempt at surgical closure, which resulted in scarring that both decreased the flap elasticity and compromised its blood supply.

It is generally accepted that the major factor affecting the success rate in septal perforation repair is the size of the perforation which, in turn, is inversely proportional to the amount of mucosa available for perforation closure. In cases where complete closure of mucosal flaps was possible on one side only, the connective tissue interposition graft, which was routinely used to strengthen the repair, provided a scaffold for the mucosa to creep on and epithelialize the raw surface of the graft. Different types of connective tissue grafts were used successfully in the repair of septal perforations, these included mastoid periostium (Wright, 1970), temporalis fascia or pericranium (Fairbanks, 1980; Kridel *et al.*, 1986), septal bone or cartilage (Goodman and Strelzow, 1982), fascia lata (Raman, 1990), and most recently; acellular dermal allografts (Kridel *et al.*, 1998). In the current study temporalis fascia was used in the first 10 cases and preserved dermal allograft (Alloderm, Lifecell Corporation, The Woodlands, Texas) in the remaining 10 cases. The success rate using both types of grafts was the same, however using the dermal allografts, although costly, held the advantage of being readily available thus saving operative time and eliminating any donor-site morbidity.

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