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Thin Nasal Shell

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1. Introduction

The Medpor Nasal Shell, available from Porex Surgical, Inc., now a Stryker company, was designed to reconstruct a saddle nose and produce an anatomically correct shape. The breakdown of the nasal shape that was used is illustrated in **Figure 1**. The shell does not extend into the tip in order to allow normal sideways movement of the tip.

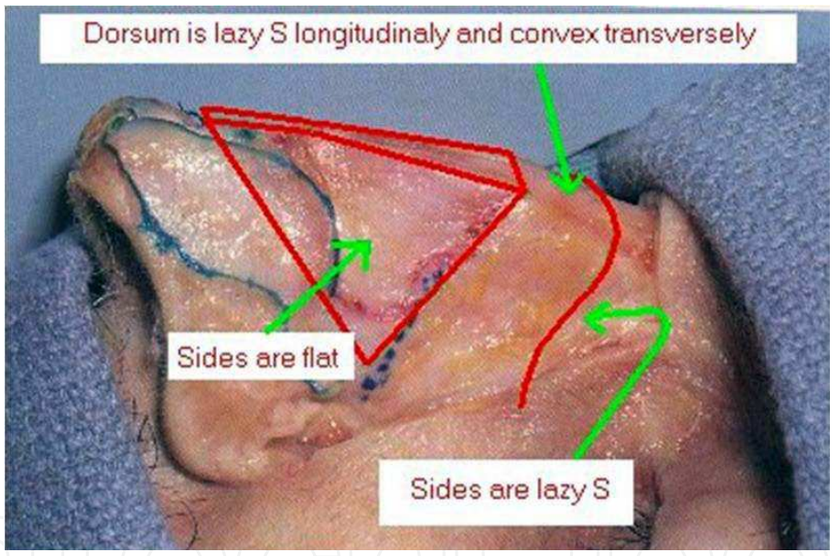


Fig. 1. Analysis of nasal shape for implant mould manufacture

The original version was first implanted in March 1999. It was thicker than the current thin shell as seen in **Figure 2** and it came with Medpor inserts that could be used to fill the void beneath the shell, **Figure 3**. Both thick and thin shells are provided with a blue silicone template **Figure 4** that can be inserted and then trimmed to a suitable dimension for the particular case. The silicone template is removed and placed over the actual implant for accurate trimming.

Eighty thick implants were placed between March 1999 and April 2005. The reconstructed noses were excellent aesthetically, **Figure 5**, and the nose tips were naturally flexible. Unfortunately, the movement between the reconstructed nasal pyramid and the nose tip resulted in implant exposure in 3 cases. The hard edge of the implant eroded through the underlying lining, **Figure 6**. Trimming the exposed Medpor initially corrected the problem

but re-exposure and infection occurred months later. These infected implants were removed and the nasal pyramids were reconstructed with cartilage grafts.



Fig. 2. Original thick Nasal Shell on left and new thin version on right

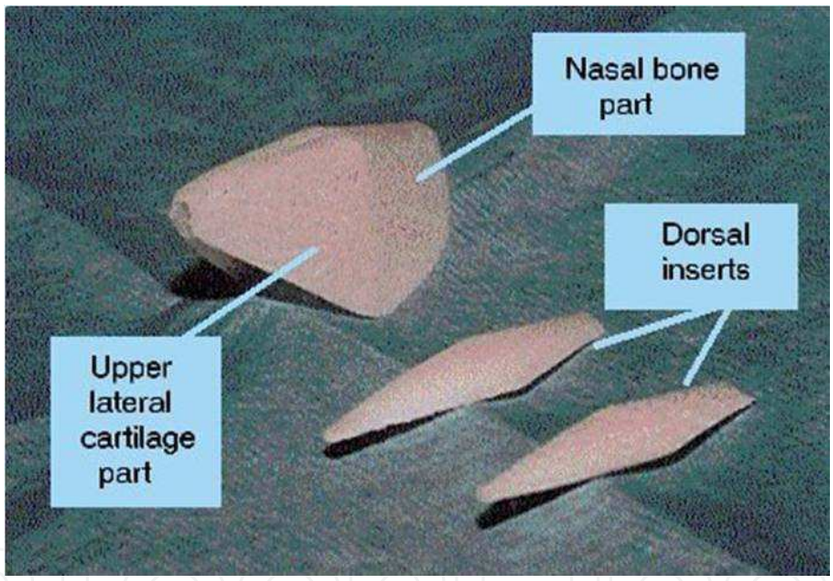


Fig. 3. Original Nasal Shell with inserts

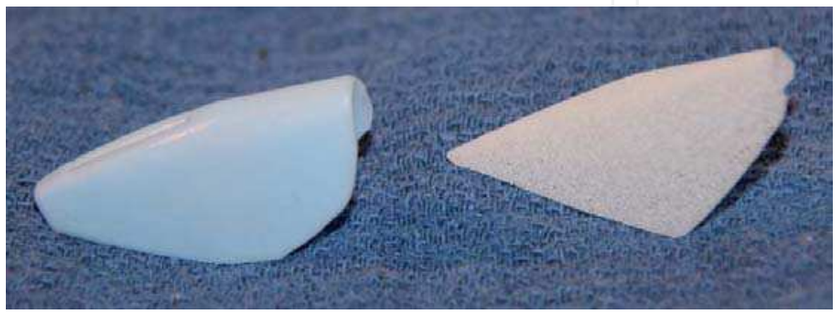


Fig. 4. Blue silicone template on left and thin shell on right

The thin Medpor Nasal Shell was designed to overcome the problems of the thicker and stiffer original Nasal Shell. The Medpor is universally thin allowing for a greater trimming of the implant, **Figure 7.** The implant is used now more as a cartilage graft forming device. Cartilage fragments are placed in the void beneath the thin shell and are expected to consolidate and grow to fill the void, **Figure 8**. If necessary, the Nasal Shell could then be removed leaving the patient with a perfectly shaped nasal pyramid. To date, very few implants have been removed but one was in response to recurrent sterile effusions. The shell was removed 13 months after implantation leaving a well formed nose **Figure 9**.

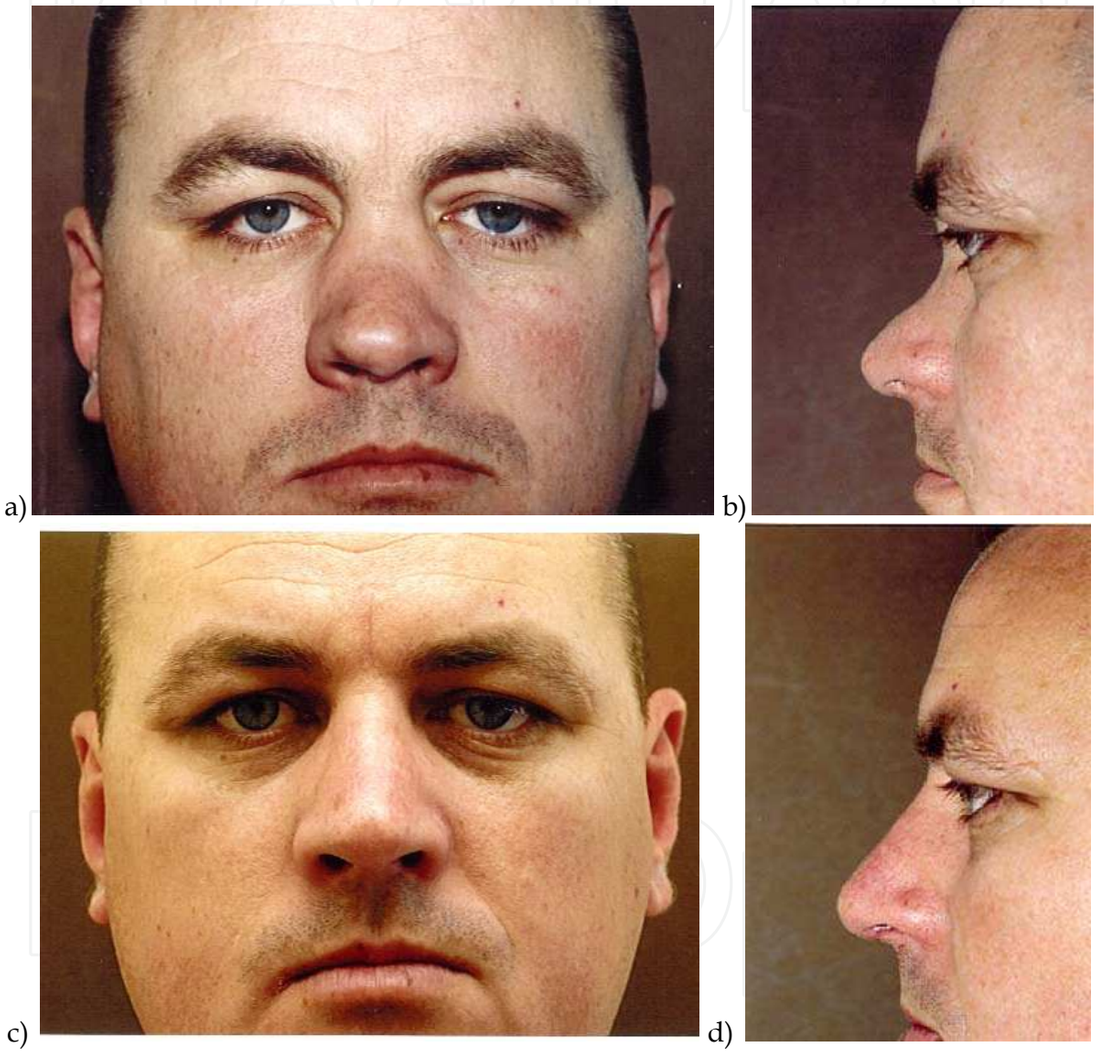


Fig. 5. a and b show patient with a saddle nose, c and d show the post-operative result with the original Nasal Shell

The Thin Nasal Shell was first implanted in April 2004 and, since then, 98 have been placed. Every implant was trimmed, usually 25%, but sometimes more than this. The trimming is done mostly at the caudal end of the implant where a cartilage extender graft is attached, **Figure 10**. The implant composite is placed over the existing deformed nasal pyramid and then cartilage fragments are placed in the void.

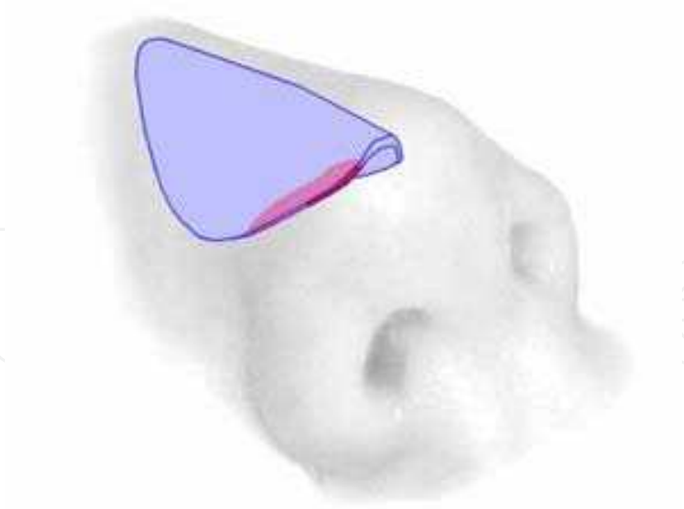


Fig. 6. Red area depicts exposed edge of Nasal Shell

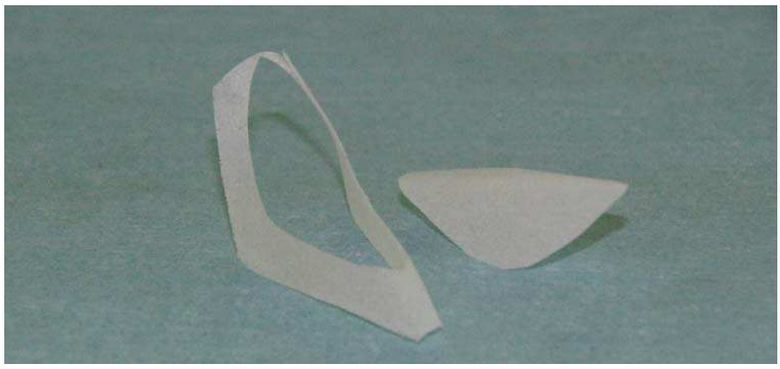


Fig. 7. A trimmed Thin Nasal Shell

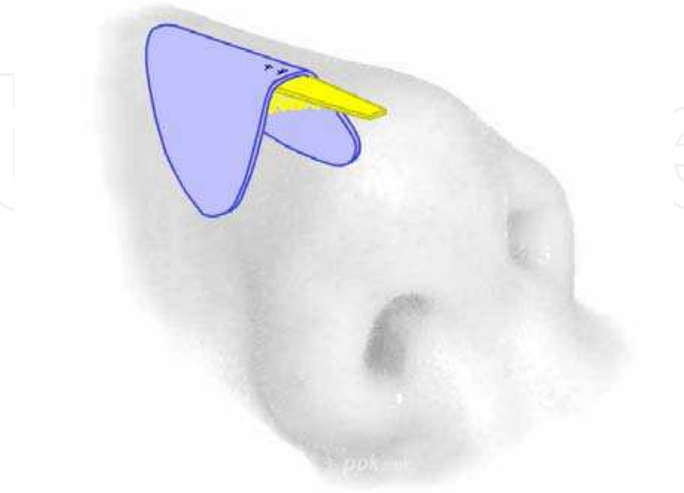


Fig. 8. A Thin Nasal Shell in situ with a cartilage extender graft and diced cartilage in the void



Fig. 9. a, b and c show a patient with a twisted costal cartilage graft in the nasal dorsum. d, e and f show post-operative result after removal of the implant. The cartilage graft associated with the implant has consolidated into a shape the patient is happy with



Fig. 10. Cartilage extender graft attached to implant

2. Technique

Nasal reconstruction with the Thin Medpor Nasal Shell plus cartilage graft is usually performed under general anaesthesia. The anaesthetist administers an intravenous dose of antibiotic at the commencement of the procedure, usually cephalothin sodium, 1g.

Cartilage is harvested from the septum, ears or ribs, in that order of preference. The nose tip is reconstructed by placement of cartilage graft as necessary before proceeding to reconstruction of the pyramid.

A blue silicone template comes with the Thin Medpor Nasal Shell, **Figure 4**. It can be placed over the nasal pyramid via intercartilaginous incisions. The template is trimmed to a suitable size for the nasal reconstruction. The template is then removed and used as a guide for trimming the Medpor implant.

The Medpor is trimmed in two stages, first to match the size of the template and second to trim back the caudal edge of the implant to expose an attached cartilage graft. The initially trimmed implant is soaked in antibiotic solution, 1g cephalothin sodium in 5ml normal saline. The cartilage graft is then sutured beneath the distal portion of the implant using 6-0 Prolene sutures. The implant is then further trimmed to leave the cartilage graft projecting beyond the implant edge as an extender graft, **Figure 11.**

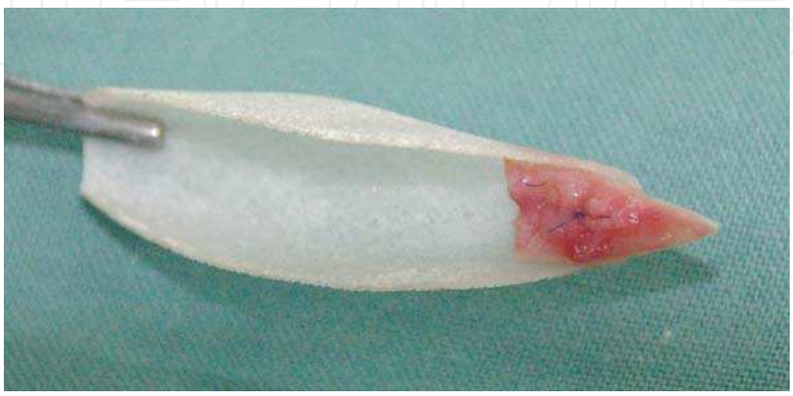


Fig. 11. Cartilage extender sutured to implant with 6/0 Prolene sutures



Fig. 12. Inserting diced cartilage into the void beneath the implant with a cut off 1ml syringe

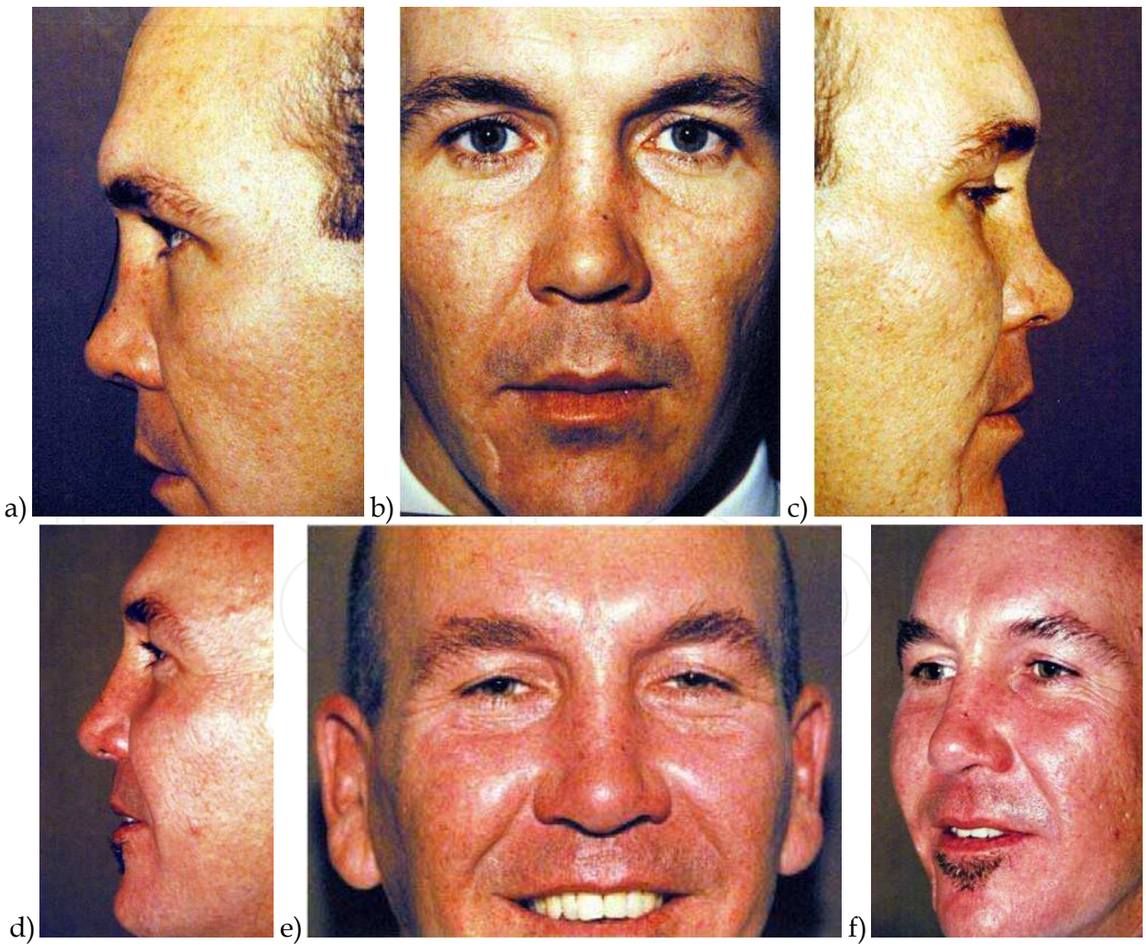


Fig. 13. a, b and c show a patient with a saddle nose. d, e and f show post-operative result following reconstruction with Thin Nasal Shell and cartilage grafts

The blue silicone template is reinserted into the nose and then partially extracted. The Nasal Shell and attached cartilage graft is then carefully inserted into the nose by sliding it over the template. The template is then removed.
Cartilage fragments are placed beneath the implant to partially fill the void. **Figure 12.** It is important to never overfill the void with cartilage fragments[1] as they act like ball bearings and the implant is likely to displace. The implant can be secured by suturing the cartilage extender graft to the nasal septum. Some of the antibiotic solution used for soaking the implant is drawn up and injected in the pocket over the implant.
Incisions are sutured with 4-0 plain catgut and a suitable nasal splint is applied. Post-operative antibiotics are given intravenously while an intravenous line is in place and then oral antibiotics are administered, usually Keflex 500mg three times a day for five days.



a) b) c) d)

Fig. 14. a and b show a patient with a saddle nose and operative plan drawn on the photos. c and d show post-operative result following reconstruction with Thin Nasal Shell and cartilage grafts

3. Results

There have been no exposures or infections of the 98 Thin Medpor Nasal Shells. Some implants displaced presumably due to over packing cartilage fragments in the void beneath the implant. Those implants were repositioned. The remaining implants have been stable since restricting filling of the void to approximately 60% with fragmented cartilage.
One patient had recurrent sterile effusions, **Figure 9**. This implant was removed 13 months after placement and the effusions disappeared. The resultant nasal shape was excellent and has been maintained indicating consolidation of the graft beneath the implant.
Airways have been improved by placement of the Thin Medpor Nasal Shell. The implant acts as an umbrella and maintains patency of the nasal valves.



Fig. 15. a and b show a patient with a saddle nose. c and d show post-operative result following reconstruction with Thin Nasal Shell and cartilage grafts

Patients who had misgivings about placement of an implant in their nose were reassured that their implant could be removed after consolidation of the graft beneath it. None of these patients have come forth postoperatively to request removal of their implant. Should removal ever become necessary it is possible because the outer surface of the implant,

although perforated, is smooth. Separation from the overlying tissue is relatively easy. The under surface is rougher but separation from deep tissue is easy enough after outer surface separation because the shell is thin and very little tissue is entrapped into its structure.
A typical patient might have a saddle nose following trauma, **Figures 13a, 13b, 13c.** The patient is obviously happy with the postoperative result, **Figures 13d, 13e, 13f. Figures 14** to **16** show similarly satisfied patients. All have improved airways.

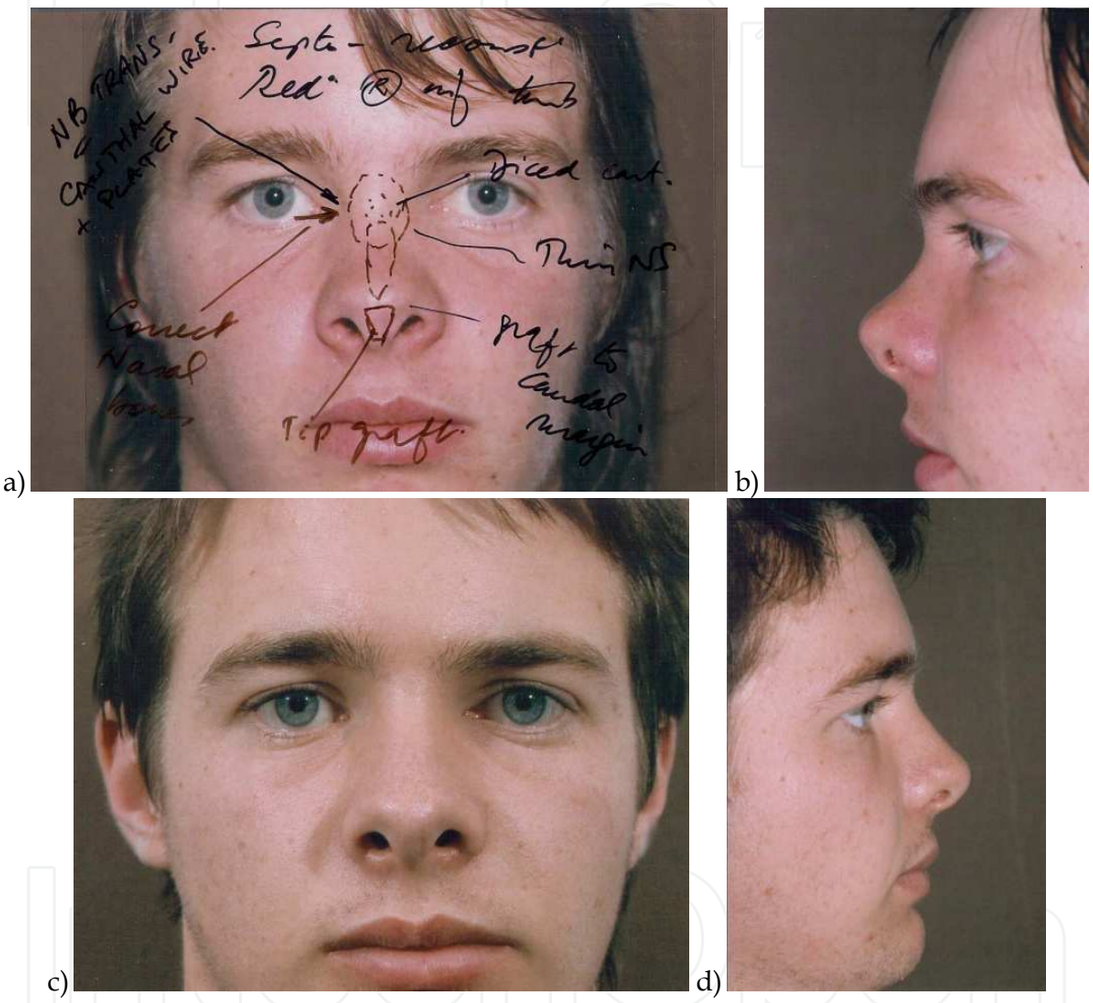


Fig. 16. a and b show a patient with a saddle nose and the detailed operative plan. c and d show post-operative result following reconstruction with Thin Nasal Shell and cartilage grafts

4. Discussion

A conventional approach to reconstruction of a saddle nose is to use the patient's own tissue with preference for septal cartilage before ear cartilage, ear cartilage before costal cartilage and costal cartilage before bone graft[2]. Bone graft is least preferred due to its tendency to atrophy over time[3,4,5,6]. Foreign implants have been shunned for nasal reconstruction by many surgeons in North America[7,8] but their use in Asia is more accepted[9,10]. An

explanation for this difference is the likelihood of trauma being involved in the case of a Caucasian patient who has a saddle nose[11]. The scarred nasal tissue may allow easier ingress of bacteria into the pocket containing the implant and result in a relatively high post-operative infection rate. Bacteria in a pocket containing cartilage or bone graft are less likely to result in clinical infection[12,13].

Restricting the reconstruction options for a Caucasian patient may not always produce the best result. Available cartilage graft may not perfectly match the ideal shape of a nasal pyramid and bone grafts are often made too large cephalically and they are too hard caudally. It is preferable to reconstruct the nasal pyramid with an object that matches normal shape and which has bony consistency in its cephalic portion and cartilaginous consistency in its caudal portion[14]. The Thin Nasal Shell with a cartilage extender attached meets this need.

Previous nasal implants have been solid objects that rest on the nasal pyramid. Pressure atrophy of the underlying bone[15,16] can occur resulting in a flatter saddle nose than before should the implant be removed to treat infection. The Thin Nasal Shell overcomes this problem by being a shell under which cartilage fragments can be placed in order for them to consolidate into an ideal shape. The nose will be a better shape than before should it be necessary to remove this implant.

The Nasal Shell was specifically designed to reconstruct only the nasal pyramid, not the nose tip. The purpose was to simulate a natural nose and allow natural movement of the tip. This limits the possibility of changing the position of the tip but, of course, a long cartilage extender can be attached in order to push the tip caudally and lengthen a short nose. In any case, more cartilage will be available for grafting into the tip because less is used in the pyramid[17].

Familiarity with the Nasal Shell advances its position on the surgeon's preference list of reconstruction options. Initially the shell will be on the bottom of the list but after rewarding results are seen it will move up the list. The author places the thin Nasal Shell plus cartilage graft after septal or auricular cartilage alone. It is far superior to bone grafts in the author's experience over 40 years.

The elegance of results makes the shell suitable for patients with thin skin. Poorly shaped bone or cartilage grafts can be obvious unless masked with dermis or fascia grafts[18,19]. It is rarely necessary to place such masking grafts over a nasal shell.

5. Conclusion

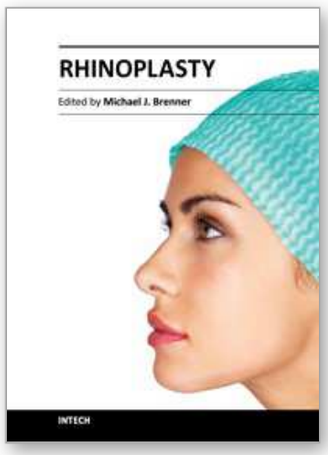
The Thin Medpor Nasal Shell used in conjunction with cartilage grafts is an excellent means for reconstruction of the nasal pyramid. The resultant nasal shape is anatomical and the umbrella effect of the implant ensures an unobstructed airway. Less donor cartilage is needed for nasal pyramid reconstruction thereby reducing donor site morbidity and leaving more cartilage graft for associated tip reconstruction.

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Rhinoplasty

Edited by Dr. Michael Brenner

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Rhinoplasty is one of the defining procedures of plastic and reconstructive surgery. Its roots stem from early efforts in nasal reconstruction to the emergence of modern rhinoplasty. This book describes the latest clinical and research perspectives in rhinoplasty and balances structural correction with aesthetic refinement. With treatises on rhinoplasty from a diverse set of thought leaders from around the world, the collective experience of this books' authors cover cosmetic and reconstructive approaches with a wealth of proven and innovative approaches ranging from minor refinement to major reconstruction. This diversity reflects the inherent complexity of the art and science of rhinoplasty. Discussion of structural approaches is balanced by consideration of judicious resection and refinement. The overarching goal is to instill an understanding of the subtleties of nasal structure and how the natural complexities of nasal anatomy can be adapted to maximize both function and natural appearance.

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