# Moderate and Major Saddle Nose; the Causes and Correction

*Salim Hussain Ibrahim*

*Department of Surgery, Medical College, Tikrit University*

## Abstract:

***Back ground:*** Saddle nose deformity is of different types and classifications, and there are several surgical approaches and grafting materials selected by the surgeons for the correction.

***Objective:*** Study the causes, surgical steps, and outcomes of correction of moderate and major saddle nose by the author using autologous iliac crest bone graft.

***Patients and method:*** A retrospective case study of 34 patients, with saddle nose, corrected by dorsal onlay graft and columella strut harvested from autologous iliac crest bone via endo-nasal approach rhinoplasty, at Salah-Elden governorate during period from Jan. 2008- Dec. 2015.

***Results:*** The common cause of saddle nose was septal abscess 16 patients (47%), nasal trauma 7 patients (20.6%), then congenital and iatrogenic causes. The cosmetic results all 34 patients (100%) get good results and satisfied for the patient's and the surgeon, with follow-up surgeon satisfaction were in 32 patients (94%). Functional improvement was (94.7%).

***Conclusions***: 1.Autologous iliac crest bone graft is good graft material for augmentation of saddle nose deformity. 2. Optimum cosmetic outcomes achieved by doing osteotomies and in fracture of nasal bones, tip plasty, and alar base resection.3. The procedure used for graft taken from iliac crest bone is relatively safe with low complications.

***Key words***: Autologous iliac crest bone graft, Saddle nose, Septal abscess, Familial saddle nose.

## Introduction:

Saddle nose deformity is depression of the nasal pyramid, It is of different types and classifications which depend up on the cause and severity of nasal saddling [1, 2], so there are several surgical approaches used by the surgeons for correction of saddle nose, all aims to repair of nasal dorsum defects, increase tip projection, improved nasal airflow, and a natural feel and appearance to the nose [3], this achieved by insertion of grafting material.

The choice of the graft material used for augmentation of saddle nose usually according to preferences of the surgeon, and nasal analysis (severity of saddling). Most rhinoplastic surgeons prefer autologous materials like septal cartilage and bones, conchal cartilage, rib cartilage, iliac crest bone. Becauseof low rates of resorption, extrusion, infection [4, 5, 6], and graft rejection [3]. But it may be associated with donor site morbidity and longer operating time, resorption and warping of graft especially for costal cartilage [7, 8]. Alloplastic materials like silicone [6], medpor [1], and homograft from cadaver like irradiated costal cartilage [4], they are readily available, easy shape and without any donor-site morbidity; but have risk of infection and extrusion. However the ideal graft material for augmentation remains controversial [4].

The main step for correction of saddle nose is grafting. In this study using of

autologous iliac crest bone graft for correction of moderate and major types of saddle nose, and we study the causes, surgical steps of the correction, and cosmetic and functional out comes.

## Patients and methods:

A retrospective case study of 34 patients with moderate and major saddle nose deformities underwent surgical correction using autologous iliac crest bone graft, (19 were female and 15patients were male), carried out at Tikrit Teaching Hospital and private Hospital, in Salah-Elden governorate, Iraq, during the period from Jan. 2008-Dec.2015.All operations were performed under general anesthesia with closed (endonasal) approach rhinoplasty by the author. Case sheet of the patient analyzed including chief complaint, history of nasal trauma, nasal infection, nasal obstruction, previous nasal surgery, medical history, family history of similar nose. ENT examinations mainly inspection of external nose includes, nasal dorsum for (depression, broadening, deviation, hump), nasal tip, columella, and alar flaring. Palpation for skin quality, tip support.

*Endoscopic nasal examination for nasal septum (deviation, perforation, thickening), turbinates, internal nasal valve…

Pre and postoperative photograph in four standard views (frontal view, left and right lateral views, and basal view) for surgical planning, postoperative evaluation, and for medico legal purposes.

The patients classified according to cause of saddle nose in to;

1. Patients with saddle nose follows infection (septal abscess).There are depression and broadened of cartilaginous pyramid with loss of support and projection of lobule, with columella retraction) figure (1).
2. Patients with saddle nose follows trauma, there are mainly bony saddling with or without deviation of nasal pyramid, loss of tip support and projection related to the severity of septal cartilage deformities figure (2).
3. Patients with iatrogenic saddle nose. Post-septorhinoplasty commonly depression of both bony and cartilaginous portion and post-septoplastysevere depression of cartilaginous pyramid figure (3).
4. Patients with familial (congenital) saddle nose .there are low and wide bony and cartilaginous pyramid and lobule figure (4).

Follow up the patients for cosmetic and functional outcomes, and complications of nasal and donor site of the graft for a minimum one year.

## Results:

Total patients are 34, Male were 15 (44%) and female were 9(56%). Table (1). Age range from 21-42 years (mean age 26 year). All 34patients (100%) presented seeking for cosmetic surgery, 19 patients (56%) complaining from nasal obstruction seeking for functional improvement also.

The patients according to cause of saddle nose are.

1. Patients with saddle nose follows infection (septal abscess).were16 (47%), (7 male and 9 female). {History of nasal trauma in 13 patients (81%), one patient (6%) follows vestibulitis (nasal boil), and two (13%) unknown cause.}
2. Patients with saddle nose follows nasal trauma. Were (7) patients (20.6%) (4 were male and 3 female).
3. Patients with iatrogenic saddle nose. Were 5 patients (14.7%) {4 patients post

eptorhinoplasty (2male, 2 female), and one male patient follow septoplasty}.

4. Patients with familial (congenital) saddle nose: 6 patients (17.6%), 5 were female and one male patient. table (1).

Nasal trauma is the commonest cause for saddle nose were 20 patients (59%); 13 patients nasal trauma complicated by septal abscess and 7 patients uncomplicated nasal trauma.

Patients presented with nasal obstruction were 19 patients (56%), 14 (74%) were due to mechanical obstruction (nasal septal deviation). Common in saddle nose due to nasal trauma 7 patient (100%), then iatrogenic saddling 3 patients (60%), in saddle nose follow septal abscess 3 patients (19%). Congenital saddle nose one case from 6(17%) table (2). And 5 patients (26%) due to mucosal and nasal valve pathology)

Septal perforation found in 2 patients (9%), one patient with iatrogenic saddle nose, and one patient follows septal abscess.

The surgical steps for correction of saddle nose according to the causes. Seen in table (4).

Cosmetic results; All 34 patients (100%) gets very good and satisfied results for both the patient and the surgeon in the early post-operative period, but with follow-up surgeon satisfaction were in 32 patients (94%), as 2 patients, one presented 18 months, other 30 months post-surgery showing surface irregularity with lateral groove (visible edges of the graft).Better cosmetic results found in congenital and iatrogenic cause. No case showing recurrence of the deformity (saddling), or obvious resorption of graft and no revision surgery was done table (3). Functional improvement was (94.7%) (from 19 patients with nasal obstruction 18 gets patent nasal airway). One patients still complaining from unilateral nasal obstruction table (3). Regarding bony graft complications: No nasal complications such as infection, or graft displacement occurs. No permanent nasal dip at the site of dorsal transcutaneous suture fixation of the graft. Donor site complications, all are minor complications like donor site transient pain were two patients (6%) relieve within one month (no patient with chronic pain), Temporary paraesthesia and numbness one patient, No major complications table (5).

**Table (1):** Classification of saddle nose according to the causes and the sex of patients.

| Causes of saddle nose* | No.% | Sex | |
|---|---|---|---|
| | | Male | Female |
| 1. Infection (Septal abscess). ** | 16 (47%) | 7 | 9 |
| 2. Trauma. | 7 (20.6%) | 4 | 3 |
| 3.Iatrogenic (postseptoplasty,septorhinoplasty) | 5 (14.7%) | 3 | 2 |
| 3. Familial (congenital.) | 6 (17.7%) | 1 | 5 |
| Total. | 34 (100%) | 15 (44%) | 19 (56%) |

**No medical causes,* ***13 patient secondary to nasal trauma.

**Table (2):** The nasal obstruction due to septal deviation in relation to cause of saddle nose.

| Cause of saddle nose | Total No. | Nasal obstruction. (septal deviation) |
|---|---|---|
| Nasal trauma. | 7 | 7 (100%) |
| Iatrogenic. | 5 | 3 (60%) |
| Septal abscess. | 16 | 3 (19%) |
| Congenital | 6 | 1 (17%) |
| Total | 34 | 14 (41%) |

**Table (3):** Cosmetic and functional outcomes according to cause of saddle nose.

| Cause of saddle nose | Cosmetic outcomes | | Functional outcomes | |
|---|---|---|---|---|
| | No. | Good result | Nasal obstruction No. | Improved |
| Nasal trauma | 7 | 6 (86%) | 7(100%) | 6(86%) |
| Iatrogenic | 5 | 5(100%) | 3(60%) | 3(100%) |
| Septal abscess | 16 | 15(93.75%) | 8(50%) | 8(100%) |
| Congenital | 6 | 6(100%) | 1(17%) | 1(100%) |
| Total | 34 | 32(94%) | 19(56%) | 18(94.7%) |

**Table (4):** surgical steps for correction of saddle nose according to the causes.

| Surgical step | Total % | Septal abscess | Trauma | Iatrogenic | Congenital |
|---|---|---|---|---|---|
| Approach ;Closed (endonasal)approach | 34 (100%) | 16 (47%) | 7 (20.6%) | 5 (14.7%) | 6 (17.7%) |
| Septoplasty. | 22 (65%) | 10 (63%) | 7 (100%) | 3 (60%) | 2 (33%) |
| Separation of upper lateral cartilage from septal cartilage | 34 (100%) | 16 (100%) | 7 (100%) | 5 (100%) | 6 (100%) |
| Resection bony hump* | 4 (11.8%) | 3 (19%) | 0 | 1 (20%) | 0 |
| Medial anl lateral percutaneous osteotomy | 34 (100%) | 16 (100%) | 7 (100%) | 5 (100%) | 6 (100%) |
| *Bilateral In-fracture<br>**Onesidein-fracture with other side out–fracture. | 31(91%)<br>3 (9%) | 16 (100%)<br>0 | 4 (57%)<br>3 (43%) | 5 (100%)<br>0 | 6 (100%)<br>0 |
| Dorsal on lay graft and colmellar strut. | 34 (100%) | 16 (100%) | 7 (100%) | 5 (100%) | 6 (100%) |
| Tip plasty(delivery approach) {Cephalic resection of lateral crura and transdomalsuture}. | 21 (62%) | 10 (62.5%) | 4 (57 %) | 1 (20%) | 6 (100%) |
| Alar base wedge resection | 18 (53%) | 10 (62.5%) | 2 (27%) | 0 | 6 (100%) |

**Table (5):** Thecomplications of augmentation rhinoplasty using autologus iliac crest bone graft.

| Donor site complications | No. | Nasal complications | No. |
|---|---|---|---|
| Pain. | 2 (8%) | Surface irregularity. | 2 (8%) |
| Paraesthesia. | 1 (4%) | | |


**Figure (1):** Saddle nose following septal abscess. (Pre and post-operative views).


**Figure (2):** Saddle nose follows nasal trauma. (Pre and post-operative views).


**Figure (3):** Saddle nose follows septorhinoplasty. (Pre and post-operative views).

Post-operative Preoperative

**Figure (4):** Congenital (Familial) saddle nose. (Pre and post-operative views).

A B

**Figure (5):** A. Intraoperativepicture shows two graft remodeled dorsal and columellar grafts.
**Figure (5):** B. Immediately post-operative (after removal of POP cast.).
*Note two transcutaneous sutures fixing the dorsal graft.

## Discussion:

The moderate and major saddle nose deformity unlike minimal saddle nose deformity where have mainly supratip depression with minor columellar retraction [9, 10]. The moderate and major saddle nose usually have more dorsal depression ,loss of tip projection with broad nostrils and alar flaring, so they needs large and strong graft material, and the size of graft more than 5 mm thickness and about 4-8 cm in length that septal and conchal cartilage does not allow harvesting such large graft [3,5,8]. In the saddle nose the septal cartilage is limited amount in the surgical field, in cases of infection (septal abscess) there are cartilage necrosis and in traumatic cases found severely deformed and fragmented septal cartilage and bones, so the iliac

crest bone graft is of choice and selected by author .The harvested iliac crest graft remodeled for two grafts (The dorsal graft and columellar strut) using bone nipper and cutting burr.

Closed approach rhinoplasty used in this study get good cosmetic and functional results, despite the open or external approach offers by many authors as more superior exposure [12]. Author used closed approach rhinoplasty that avoiding columellar scar, and less dissection required, therefore minimizing soft tissue trauma and subsequent scarring [5], and can do tunnel that made the fixation of bony graft better and reduce graft extrusion post operatively. In close approach can peroperatively estimate the cosmetic result when the dorsal graft and columellar strut inserted via the transcutaneous nylon sutures, which inserted through two small drill holes made in the upper and lower part of grafts for fixation in midline position and prevent graft displacement. The dorsal onlay graft is to increase dorsal projection and the columellar strut to increase tip projection, and prevent down ward tilting of dorsal end of dorsal graft [13].

Other surgical steps includes, medial osteotomy,lateral percutaneous osteotomies and in-fracture to push the bony structure forward increasing protrusion of the dorsum, and narrowing bony pyramid. Tipplasty via delivery approach including cephalic resection of lateral crura and transdomal suture, and alar base wedge resection for nasal flare, all these steps are important to obtain good cosmetic results commonly done in familial (congenital) saddle nose and saddle nose follows septal abscess table (4). Dehumping for bony hump in 3 cases where severe collapse of septal cartilage as in septal abscess in patients with already having dorsal hump, sometime rasping of small hump to get better nasal profile and to insert the graft extended from nasion to the tip to avoid dorsal irregularity). Septoplasty was done for all traumatic cases (7) patients 100%), and follows septal abscess (63%) table (4).

The cosmetic results; the success rate of use of iliac crest graft for correction of saddle nose varies according to different studies from (78%) (Tardyand, Schwartz, 1989) [13], (90%) (Sarukawas, sugawara, et.al, 2004) [14], (92%) (Goodman, gilbert, 1985) [15], (98%) (Muhammad, Saeed, ZafarFarooq, 2012) [16], (100%) (Karacaoglan, Uygloa, 1998) [17]. Our study for cosmetic results, early postoperative the satisfaction rate of the patient and the surgeon was (100%), but surgeon satisfaction rate decline to (94%) with follow up as two cases with saddle nose, both have thin skin gets surface irregularity . Thedorsal graft become visible with depression on both sides (groove) may be results of soft tissue scarring, or the concavity of ventral surface of the implant not fit the curvature of the dorsum of the nose, or some resorption of bone graft. The harvested iliac crest graft remodeled for two grafts. (The dorsal graft and columellar strut) by using bone nipper and cutting burr to get a smooth surface and do ventral groove in the dorsal graft to fit the nasal bones after doing lateral osteotomy and in-fracture. The surface irregularity becomes obvious in patients with thin skin. Both patients were satisfied and refuse revision surgery to fill up this groove. No recurrence of the deformity (nasal saddling).

Functional improvement in this study was (94.7%). Septoplasty was done for

22 patients, 14 patients with symptomatic septal deviation (nasal obstruction) and 8 patients with asymptomatic septal deviation that may affect breathing with doing lateral osteotomy and in-fracture of nasal bone table (4). The correction of septal deformities in augmentation rhinoplasty can be done aggressively without limitation because we well insert dorsal onlay graft and columellar strut. And the separation of upper lateral cartilage from dorsal septal cartilage and insertion of dorsal bone graft will open the nasal septum angle and expand the internal nasal valve, gives excellent result for nasal obstruction. Septoplasty was done for all traumatic cases 7 patients (100%), then follows septal abscess and iatrogenic causes were (63%), and (60%) respectively.

Regarding donor site complications. The augmentation rhinoplasty for saddle nose usually needs a relatively small bone graft taken, so limit the exposure of the iliac bone and the author dissection usually done superior-lateral to the iliac crest and the graft is obtained by entry through the lateral cortical plate, not penetrating the inner cortex [(18)]. So we gets less donor site complications that may occurs when large graft taken for orthopedic and maxillofacial procedures, and when take graft from the posterior iliac crest[(19)], so there are no major donor site complications reported, like infection, retroperitoneal haematoma, peritoneal perforation ,stress fracture and hernia. Only minor complications [(20)] occurs table (5).

## Conclusions:

1. Autologous iliac crest bone graft is good graft material for augmentation of moderate and major saddle nose deformity, using dorsal onlay graft and columellar strut.
2. Optimum cosmetic outcomes achieved by doing osteotomies and in fracture of nasal bones, tipplasty, and alar base resection. And septoplasty with separation of upper lateral cartilage from septal cartilage gives good functional results.
3. The procedure used for graft taken from iliac crest bone is relatively safe with low complications.


## Acknowledgment:

The author would like to thank all patients who participate in this study.


## Conflict of interest:

None.

## References:


[1]. G.J.Nolsttrenite, Rhinoplasty (Apracticalquide to functional and esthetic surgery of the nose, 3rd edition, Kugler publication, 2005...

[2]. Daniel RK, Brenner KA. Saddle nose deformity: a new classification and treatment. Facial PlastSurgClin North Am.2006; 14:301–312.

[3]. Taha Z. Shipchandler, Brian J. Chung; Daniel S. Alam, Saddle Nose Deformity Reconstruction with a Split CalvarialBoneL-Shaped Strut. *Arch Facial Plast Surg. 2008; 10(5):305-31*

[4]. F. Kasapoğlu, O.A. ozmen,et al. Augmentation rhinoplasty with autogenous cartilage grafts.Turk Arch Otolaryngol, 2011; 49(1):1-4.

[5]. Balwant Singh Gendeh.Clinical Study of Graft Selection in Malaysian. RhinoplastyPatients.ISRNOtolaryngology. Volume 2013 (2013), Article ID 639643, 8 pages

[6]. Jennifer, Parker, Porter Grafts in rhinoplastyalloplastic vs autogenous Arch otolaryngolheadand neck surg 2000; 126: 558–561.

[7]. Harley S. Dresner, Peter A. Hilger. An Overview of Nasal Dorsal Augmentation. SeminPlast Surg. 2008 May; 22(2): 65–73.
[8]. Clyde H. Ishii.Current Update in Asian Rhinoplasty, PlastReconstr SurgGlob Open. 2014 Apr; 2(4): e133.
[9]. M. Durbec, F. Disant, Saddle nose: Classification and therapeutic management, European Annals of Otorhinolaryngology, Head and Neck diseases (2014) 131, 99-106.
[10]. WaelKhamis Abdel-Hamid Hussein, Saddle nose: Autologous augmentation techniques and their relevant patientsatisfaction, Egyptian Journal of Ear, Nose, Throat and Allied Sciences (2015) 16, 113–122.
[11]. Gendeh, Vincent E S Tan. Open Septorhinoplasty: Operative Technique andGrafts. Med J Malaysia Vol 62 No 1 March 2007.
[12]. Daniel RK. Rhinoplasty: Septal saddle nose deformity and composite reconstruction. PlastReconstrSurg 2007; 119:1029-43.
[13]. Tardy ME Jr, Schwartz M, Parras G. Saddle nose deformity: autogenous graft repair. *Facial Plast Surg*. 1989; 6(2):121-134.
[14]. Sarukawas, Sugawara Y, HarriikCephlometriclong term follow up of nasal augmentation using iliac bone graft J Craniomaxillofacial 2004; 32: 233
[15]. Goodman WS, Gilbert RW Augmentationrhinoplasty a personal review J Otolaryngol1985; 14: 107–12.
[16]. Muhammad Saeed, Zafar Hussain, Farooq Ahmad Mian. Augmentation Rhinoplasty with Autologus Iliac Crest Bone Graft. A.P.M.C Vol: 6 No.1 January-June 2012.
[17]. Karacaoglan N, UygalOa Use of iliac bone graftfor saddle nose deformity AurisNagus Larynx1998; 25: 49 – 57.
[18]. Nabil A. Ebraheim, HosseinElgafy, andRongming Xu, Bone-Graft Harvesting From Iliac and Fibular .Donor Sites: Techniques and Complications. J. Am AcadOrthopSurg 2001; 9:210-218
[19]. James A. Goulet, Laura E. Senunas,et.al. Autogenous Iliac Crest Bone Graft,Complications and Functional Assessment .clinical orthopaedics and related research.Number 339, pp 76-81,1997.
[20]. Safaariyadh, raja kummoonaetal. Donor site complications after harvestingbone graft from the anterior iliac crest in oral and maxillofacial surgery. kufamed.journal 2009.vol.12.No1.