International Journal of Otorhinolaryngology and Head and Neck Surgery
Kedarnath R et al. Int J Otorhinolaryngol Head Neck Surg. 2017 Jul;3(3):539-545
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

Original Research Article

DOI: http://dx.doi.org/10.18203/issn.2454-5929.ijohns20171581

Descriptive study of endoscope assisted creation of neoturbinate by antral mucosal inversion in atrophic rhinitis

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Received: 27 March 2017
Accepted: 11 April 2017

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ABSTRACT

Background: As the exact etiology is not known, treatment is directed towards symptomatic relief. Medical treatment leads only to temporary remission of symptoms. Over the years, surgeons have attempted various techniques for long term relief of symptoms. Most of the techniques have been directed to the narrowing of the nasal cavity.
Methods: All the cases diagnosed as primary atrophic rhinitis and who were willing to undergo this surgery were taken for the study. The cases diagnosed as primary atrophic rhinitis were subjected to detailed history and examination. Clinically following conditions were ruled out – tuberculosis, syphilis, rhinoscleroma, leprosy. A routine haemogram (Hb%, TC, DC, BT, CT), urine examination (albumin, sugar, microscopy), ESR serum VDRL was done for the patients.
Results: We were successful in creating a neoturbinate in 12 patients in our study. Of these, majority of the patients (6 patients) had their duration of symptoms between 2-4 years, the outcome in them are excellent in 4 patients, good in 2 patients.
Conclusions: The results are encouraging with reduced crusting, healthier mucosa and some patients even regaining their sense of smell. All these above, with no nasal obstruction or pinched nostrils as may occur in young's closure. But the effort involved is more in this surgical procedure.

Keywords: Atrophic rhinitis, Antral mucosal inversion, Neoturbinate

INTRODUCTION

Atrophic rhinitis is one of the chronic distressing disease affecting the nose. It was first described by Fraenkel (1876). Until now it remains unexplained as to what are the aetiological factors and an effective modality of treatment for this distressing disease.[1]

Atrophic rhinitis is a chronic nasal disease characterized by progressive atrophy of the nasal mucosa and underlying bone of the turbinates and the presence of viscid secretions which rapidly dries and forms crusts which emits a characteristic foul odour sometimes called oazena (a stench).

Atrophic rhinitis is a fairly frequent disease in tropical countries. Though atrophic rhinitis is not a crippling disease which renders the patient bed ridden or endanger to his life, it causes a lot of suffering due to ozaena, anosmia, nasal obstruction, epistaxis, headache etc. the disease is many a times left undiagnosed and untreated as the complaints are minor and usually neglected by the patient in the early stages. But the disease becomes a major illness particularly if it results to complications such as septal perforation, palatal perforation, nasal deformity or major complications like meningitis.[2]

Atrophic rhinitis is a curse for the patients affected. The loathsome foetor becomes a social stigma for them and are forced to be social. Outcasts on this account. The

social rejection experienced by those with ozaena beginning early in childhood and the sleep disturbances caused by nasal obstruction often results in marked psychotic behavior.[3]

As the exact etiology is not known, treatment is directed towards symptomatic relief. Medical treatment leads only to temporary remission of symptoms. Over the years, surgeons have attempted various techniques for long term relief of symptoms. Most of the techniques have been directed to the narrowing of the nasal cavity. Inert foreign or synthetic materials have been implanted submucosally but this modality of the treatment has been purely temporary and foreign materials have been expelled from the nose in the due course of time.[4]

In this study i.e., endoscope assisted creation of neoturbinate by antral mucosal inversion in atrophic rhinitis, an attempt has been made not only to narrow the nasal cavity and decrease the incoming blast of air but also simultaneously to increase the nasal secretions. Moreover, no use of foreign or synthetic materials, heterogenous grafts hence no rejection.

METHODS

All the cases diagnosed as primary atrophic rhinitis and who were willing to undergo this surgery were taken for the study. The sample size was 20.

Inclusion criteria were patients with primary atrophic rhinitis. Exclusion criteria were patients with secondary atrophic rhinitis.

Method of data collection

- The cases diagnosed as primary atrophic rhinitis were subjected to detailed history and examination. Clinically following conditions were ruled out – tuberculosis, syphilis, rhinoscleroma, leprosy.
- A routine haemogram (Hb%, TC, DC, BT, CT), urine examination (albumin, sugar, microscopy), ESR serum VDRL was done for the patients.
- Histophathological examination of the nasal mucosa from the inferior turbinate, X-ray paranasal sinus (Water's view) was done.
- When required X-ray chest/skin split smear was done.

Preoperative preparation

Xylocaine test done was done with 0.1 ml of 2% xylocaine injected intradermally on the left forearm.

Premedication

Premedicaiton was given to patients in the form of combination of 25 mg promethazine, 30 mg pentazocine and 0.6 mg atropine intramuscularly in the gluteal region, 30 minutes prior to surgery.

Position of the patient

Supine with head slightly elevated and turned towards the surgeon, who is sitting at the right side of the patient.

Anaesthesia

All the patients underwent the procedure under local anaesthesia. Local anaesthesia of 2% xylocaine with adrenaline (1 in 2 lakhs) was used for infiltration. 4% xylocaine (10 cc) + 0.3 ml adrenaline soaked cottonoids were used for stopping excessive localized bleeding.

Equipments

- Nasal endoscopes – Hopkins rod optical system with cold light source and fibre optic light delivery system. Endoscopes used were 0^0 and 30^0 angles of view and 4mm diameters.
- Mollison's self retaining mastoid retractor
- Freer's elevator (curved)
- Kerrison's punch
- Suction apparatus, cannula
- Antifog solution (Savlon).

Procedure

After local infiltration, a sublabial incision is taken and the canine fossa is exposed. The anterior wall of the maxilla is drilled initially with a cutting burr and later on with big diamond burr and an wide opening is made taking care that the muccoperiosteum of the antrum is not perofrated.

Graudally, under endoscopic vision the whole of the maxillary sinus mucoperiosteum is separated from the bony walls using cottonoids dipped in 4% xylocaine with adrenaline. The peeledof mucosa in the form of a bag is inverted into the nasal cavity through the ostium with epithelial surface outwards and periosteal surface inwards. When required antero inferior uncinectomy is done to widen the ostium area. The inverted mucoperiosteal bag is bolgerized to septum by means of chromic catgut sutures.

The maxillary sinus is again checked for bleeding areas, for no packing is inserted into the sinus or the nasal cavity.

Bleeding from the bony walls of the antrum can be stopped with a diamond burr. Sublabial wound is closed with chromic catgut sutures.

Post-operative care was done by giving antibiotics**,** saline nasal douche to wash out the crusts, ice packs for local application on the cheek**,** enzyme preparations to reduce cheek swelling**,** drainage of collection in the antrum by tilley lichwitz cannula sublabially and suction clearance of the nasal cavity to remove the crusts and look for the vitality of neoturbinate.

Thus adequate preoperative workup, adequate expertise, local anaesthesia and good post-operative care is necessary so as to attain a good surgical outcome and also to prevent complications.

Apart from noting the outcome of such a surgical procedure an attempt is also made to study the difficulties faced during such a surgical procedure and possible modifications in the surgical steps.

The proforma containing the information regarding the clinical data and observations made is finally complied as shown in the master chart.

Followup of patients

All the patients were followed up at 3 and 6 months. In most of the patients we have a follow up for a period of more than one year. At each followup we took a subjective history of crusts formation, nasal discharge, sense of smell, nasal obstruction and objective findings of presence of crusts, condition of the mucosa, turbinates and appearance of the neoturbinate in terms of its presence / size / colour / crusting were noted.

Grading of clinical improvement

Sinha et al (1977) has put forth his grading of clinical improvement as good, fair and poor. We have come out with a modification in the grading of clinical improvement by adding excellent for those patients who regained their sense of smell.

Criteria for grading of clinical improvement

- **Excellent** – Patients free of symptoms and who regained their sense of smell.
- **Good** – Patients free of symptoms except anosmia.
- **Fair** – Patients with reduced crusting requiring less number of nasal douches per day for being crusts free.
- **Poor** – Patients who did not show any change in their symptomatology.

RESULTS

In our study all the patients had haemoglobin level of ≥10 gm%. One of the etiological theory proposed for atrophic rhinitis is iron deficiency anaemia but none of the patients in our study had signs of anaemia.

Table 1: Haemoglobin level.

Haemoglobin (gms%)	Number of patients	Percentage
< 10	-	-
10-12	14	70
> 12	6	30

In our study in 16 patients (80%) X-ray paranasal sinus (water's view) was normal and in 4 patients (20%) showed haziness.

Table 2: X-ray paranasal sinus.

X-ray PNS	Number of patients	Percentage
Normal	16	80
Hazy	4	20

In our study 4 patients (20%) had incomplete bony septae in the floor of the antrum and 2 patients (10%) had hypoplastic antrum. In these 4 patients with bony septae in the floor, difficulty faced in elevating the mucoperiosteum and in the other 2 patients with hypoplastic antrum surgery was abandoned and other surgical modality (Young's closure) was done in these patients.

Table 3: Anatomical variations.

Variations	Number of patients	Percentage
Bony septae along the floor	4	20
Hypoplastic antrum	2	10

Few modifications were done in the surgical procedure, antero inferior uncinectomy for widening the ostrium area was done in 4 patients (20%) which made antral mucosal inversion easier. Use of Mollison's self retaining mastoid retractor helped to attain a wider operative field instead of an assistant retracting the cheek with 2 right angle retractors.

Table 4: Outcome in bologerized cases with or without uncinectomy.

Outcome	With uncinectomy (4 patients)	Without uncinectomy (8 patients)
Excellent	2 (50%)	3 (37.5%)
Good	1 (25%)	2 (25%)
Fair	1 (25%)	3 (37.5%)

In our study, one patient known case of hypertension had severe per operative bleeding for which surgery was abandoned. 1 patient had gaping of sublabial wound, secondary suturing was done and it healed well.

Table 5: Complications.

Complications	Number of patients	Outcome
Per-operative bleeding	1	Poor
Sublabial wound gape	1	Fair

Table 6: Reasons for failed surgical attempts.

Factors responsible	Number of patients	Outcome
Hypoplastic antrum	2	Surgery abandoned
Thin mucosa	2	Surgery abandoned
Per-operative bleeding	1	Surgery abandoned

Table 7: Correlation between duration of symptoms and outcome in bolgerized cases.

Duration of symptoms	Number of Patients	Outcome
< 2 years	1	Good
2-4 years	6	4-Excellent
		2-Good
> 4 years	5	1-Excellent
		4-Fair

In our study 4 patients (20%) showed haziness of the maxillary sinus on X-ray PNS (water's view). In two of these patients the proposed procedure could not be carried due to hypoplastic antrum.

Table 8: Outcome in patients with haziness of X-ray PNS.

Number of patients	Outcome	Factor responsible
2	Poor	Hypoplastic antrum
1	Poor	Per-operative bleeding
1	Good	

In our study we have encountered 2 patients (10%) with hypoplastic antrum, 2 patients (10%) with thin antral mucosa which was difficult to elevate without damaging it.

In our study we had 3 patients (15%) with post-operative failures. Wherein we could not Bolgerize the mucoperiosteal bag to the septum. Over a period of time the mucoperiosteal bag regressed in size and later disappeared from the nasal cavity.

In our study 4 patients (20%) had undergone uncinectomy. The outcome in them being, 2 patients (10%) excellent, 1 patient (5%) good and 1 patient (5%) fair. In 8 patients (40%) without uncinectomy, the outcome are excellent in 3 patients (15%), good in 2 patients (10%) and fair in 3 patients (15%).

We were successful in creating a neoturbinate in 12 patients in our study. Of these, majority of the patients (6 patients) had their duration of symptoms between 2-4 years, the outcome in them are excellent in 4 patients, good in 2 patients. 5 patients had their duration of symptoms for more than 4 years. The outcome in them are, excellent in 1 patient and fair in 4 patients. Only one patient had his symptoms for less than a year, he had a good outcome.

Table 9: Correlation between number of patients, duration of symptoms and outcome.

Duration of symptoms	Bolgerized Cases	Unbolgerized cases (postoperative failures)	Failed attempts
< 2 years	1 (Good)	-	-
2-4 years	4(Excellent) 2 (Good)	2 (Poor)	4 (Poor)
> 4 years	1(Excellent) 4 (Fair)	1 (Poor)	1 (Poor)

In our study 8 patients (40%) showed no regression in the size of the neoturbinate in the follow up period. 4 patients (20%) showed regression in the size of the neoturbinate.

Table 10: Condition of neoturbinate.

Neoturbinate	Number of patients	Percentage
No regression	8	40
Regression	4	20

In our study we have come out with following success rates

Table 11: Success rate of the study.

Success rate	Percentage
Including failed attempts	60% (12/20)
Excluding failed attempts	75% (15/20)
Unbolgerized cases	0% (0/20)
Bolgerized cases	**100%** (12/12)

DISCUSSION

The study included 20 patients of primary atrophic rhinitis who were willing for the surgical line of treatment. All the cases were investigated for causes of secondary atrophic rhinitis. None of the patients showed any signs of leprosy, syphilis, rhinoscleroma or tuberculosis.

As has been shown in Table 1, in our study age of the patients varied between 19 and 65 years, with a mean of 29.9 years. In our study the majority of the patients, 10 cases (50%) were in the third decade. In a study by Gadre, 32.4% of patients (of 37 patients) were in the third decade.[3]

In the present study 9 patients i.e., 45% were males while 11 patients i.e., 55% were females, there is a female predominance. According to Pampori, female

predominance was 77.7% and according to Sharan, a male predominance of 85.7% was noted.[4,5]

Even though it is said that atrophic rhinitis is common at puberty it was not seen in our study. Because these studies involve only patients who are willing to undergo the surgical procedure, these numerical variations in the age distribution and sex predominance are bound to occur.

As shown in Table 3, in our study all the patients belonged to low socioeconomic status. Ssali (1973) stated, atrophic rhinitis to be a disease prevalent among the poor or malnourished individuals.[6] Hence it is found less and less frequently in more developed countries while it is common in developing ones.

As shown in Table 4, in our study foul smelling nasal discharge and falling of crusts were the most common symptoms which were present in all patients (100%). The next common complaints were loss of sense of smell in 19 patients (95%), nasal obstruction in 16 patients (80%). The other symptoms were bleeding from the nose in 9 patients (45%), headache in 9 patients (45%) and maggots infestation in 2 patients (10%). According to study done by Gadre, foul smelling Nasal discharge and crusting were present in all patients (100%).[3] Similar findings were observed in our study.

Abnormality of smell can be anosmia or hyposmia. Anosmia may be present and the patients are often made aware of the loathsome effluvium surrounding them by the reluctance of others to come within their vicinity. It has been reported that, anosmia can be a presenting feature in 40-90% of the patients by Datti.[7] The nerve endings undergo degeneration leading to hyposmia or anosmia depending on the severity of the disease. In our study also 5% patients had normal olfaction and in 95% patients had anosmia, similar to other studies.

In patients (10%) with previous history of maggots infestation, patients were taken up for the surgery, only once they were free from maggots and adequate antibiotics given to treat the local infection. But among these 2 cases we were able to create a neoturbinate in only 1 case, the other case had per-operative bleeding secondary to hypertension, for which surgery was abandoned.

As shown in Table 5, majority of patients had duration of symptoms ranging from 2-4 years. However there was significant number of patients whose duration of symptoms was more than a period of 4 years, only one patient had his symptoms of duration less than 2 years. According to Sharan, good results were obtained in patients with shorter duration of symptoms, similar observations were noted in our study also.[5] the outcome in patients with duration of symptoms between 2 to 4 years are, excellent in 4 patients (20%), good in 2 patients (10%), considering only the bolgerized cases.

As shown in Table 6, in our study the most common clinical signs were crusting, roomy nasal cavity, atrophic nasal mucosa and atrophic turbinates in all 20 patients (100%). The other findings were deviated nasal septum in 5 patients (25%), septal perforation in 2 patients (10%). According to Gadre, the most common signs were roomy nasal cavity (100%), nasal crusting (100%), turbinate atrophy (86%).[3] Similar findings were observed in our study. According to Pampori, bilaterality of the disease was 80% and unilateral in 20%. Unilateral atrophic rhinitis had deviated nasal septum to the opposite side.

Haemoglobin level

All the patients had haemoglobin level of ≥10 gms%. None of the patients had any signs of anaemia. Bernat (1965) concluded both from his experimental studies and from the results of iron therapy in his patients that atrophic rhinitis is a disease due to hyposiderosis, but this was not noted in our study.[5]

X-ray paranasal sinus

X-ray paranasal sinus (Water's view) showed haziness in 4 patients (20%), but none of the patients had any signs of inflammation or sinus tenderness. According to Hagrass et al (1992), they noted haziness of the maxillary sinus in 55% of the patients.[6] He stated that haziness demonstrated radiologically in noninfective maxillary sinuses is due to considerable thickening of the wall of the maxillary sinuses. Among 4 patients with haziness, 2 patients had hypoplastic antrum, 1 patient had per-operative bleeding for which surgery was abandoned, whereas in only one patient we created a neouturbinate and had a good outcome.

Complications

In 2 patients (10%) we have encountered complications. One patient had severe per-operative bleeding secondary to hypertension. Another patient had gaping of the sublabial wound for which secondary suturing was done, subsequently had an uneventful recovery.

Post-operative follow up (bolgerized cases)

In 12 patients (60%) we were successful in creating a good mucoperiosteal bag and bolgerized it to the septum. Size of the mucoperiosteal bag differed in patients depending upon the size of the antrum. The analysis of outcome at 3 months, 6 months and 1 year post-operative period in these 12 patients in mentioned below.

At 3 months only bolgerized cases

We were successful in creating a neoturbinate in 12 patients (60%). Improvement in their symptoms was noted in all the patients. 4 patients were crusts free and other 8 patients had reduced crusting when compared to

the pre-operative period. 2 patients reported to have regained their sense of smell.

On clinical examination, the condition of the neoturbinate in terms of its colour, size, attachment to the septum was noted. In all the 12 patients attachment of the neoturbinate to the septum was noted with no crusts on the neoturbinate. Out of these 12 patients, 6 patients had no crusts, with a pink nasal mucosa and normal turbinates. In the other 6 patients, showed crusts, pale mucosa and atrophic turbinates.

At 6 months (only bolgerized cases)

Among our 12 patients where we have created a neoturbinate, 8 patients had no complaints of crusting, with 4 patients had reduced crusting. 5 patients had regained their sense of smell. None of these patients complained of nasal obstruction or bleeding from the nose.

On clinical examination, at 6 months followup period, regression in the size of the neoturbinate was noted in 4 patients. With regression, crusts were present in 3 patients and 1 patient was free of crusts. Another group of 8 patients showed no regression in the size of the neoturbinate. In these patients there was no crusting in the nose with a pink mucosa and normal turbinates. It has been seen in our study that, those of the cases where a wider bolgerization of the mucoperiosteal bag to the septum was made did not show regression.

Long term follow up (> 1 year) –bolgerized cases

In most of the patients we have a followup of more than 1 year. It has been seen that, 4 patients who showed regression in the size of the neoturbinate at 6 months post-operative followup period, showed still more regression in the size of neoturbinate but with no deterioration in their clinical improvement. 8 patients who did not show any signs of regression at 6 months followup period continued to remain so at 1 year followup.

Followup-unbolgerized cases

In 3 patients wherein we could not bolgerize the mucoperiosteal bag to the septum, no improvement in the symptoms or signs were noted. This indicates the importance of bolgerization of the mucoperiosteal bag to the septum.

Outcome

Bolgerized cases

Outcome at 6 months postoperative period in bolgerized cases are excellent in 5 patients, good in 3 patients, and fair 4 patients.

Success rates

Considering only the bolgerized cases we have a success rate of 100%. If we consider unbolgerized cases it is 0%, indicating in importance of bolgerization of the mucoperiosteal bag to the septum, without which no improvement in the symptomatology is to be expected. Over all we have a success rate of 60% (12 cases), including failed attempts (5 cases) and unbolgerized cases (3 cases).

Difficulties faced during the procedure

In our study, we have faced difficulty at few steps in the surgical procedure:

- In cases with imcomplete bony septae along the floor, extra precations and care was taken to elevate the mucoperiosteum, without damaging it. Curved end of Freer's elevator, cottonoids and endoscope helped us in these areas in creating a good mucoperiosteal bag.
- Within the antrum elevation of the mucoperiosteum was found to be difficult in the anterolateral, inferomedical wall and the ostium area. 0^0 and 30^0 endoscopes helped us in these areas for elevation under better vision.
- Inversion of the mucoperiosteal bag into the nasal cavity is also a difficult step in the surgical procedure. From the antral side we had to push it with curved round ended suction tip and pulling with the help of forceps into the nasal cavity. These 2 steps i.e., pushing and pulling should go hand in hand. Under endoscopic vision and with anteroinferior uncinectomy this step was made easier. In this step care to be taken that the mucosal surface is ouside an periosteal surface within, if one fails at this step than the basic principle of the procedure is not fulfilled.
- Bolgerization of the mucoperiosteal bag to the septum was done with3-0 chromic catgut initially, but with difficulty. So in the later cases we have used smaller size needles (4-0 chromic catgut) which made this step easier.

CONCLUSION

As compared to other surgical procedures in atrophic rhinitis, transplantation of the maxillary sinus mucosa is technically the most difficult one. Intact elevation of the mucoperiosteal sac is hampered by incomplete bony septae, nooks and corners of the maxillary sinus, thin mucosa. These difficulties are to some extent overcome by the cock eyed angular vision of the nasal endoscope and diamond burr. Proper inversion of the mucoperiosteal bag though the natural ostium is not easy without endoscopic uncinectomy. Endoscope assisted multiple continuous sutures with finer curved cutting needle helps in bolgerizing the mucoperiosteal bag to a wider raw area created on the septum.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kedarnath R, Mushtaq S. Descriptive study of endoscope assisted creation of neoturbinate by antral mucosal inversion in atrophic rhinitis. Int J Otorhinolaryngol Head Neck Surg 2017;3:539-45.