1. Introduction

Synechiae are one of the most common unwanted outcomes following functional endoscopic sinus surgery (FESS), with an incidence rate of 10%–40% [2]. Nasal synechiae or turbinate synechiae is a condition in which there is adhesion of one turbinate to another, to another part of same turbinate, to the lateral wall or less commonly to the nasal septum [1]. It is typically a complication of chronic nasal lesions with epithelial ulceration or other mucosal changes like inflammatory, degenerative, necrotic, hyperplastic or metaplastic lesions. Most of the synechiae tend to involve the inferior or middle turbinate. Patients undergoing primary FESS and NSR (nasal septal reconstruction) are at greatest risk of developing post-operative synechiae [3]. There is no similar reference in Ayurvedic classics which resembles nasal synechiae in its pathologic aspect; however it can be correlated with nasaprathinah as the main symptoms include difficulty in breathing and blocked nose with narrowing of the passage. Various studies have been conducted evaluating the incidence of synechiae post-operatively, its impact on quality of life, and various methods to prevent its occurrence; however, no studies have been reported regarding the management of synechiae or its recurrence after surgical correction. Kshara Sutra, a treatment modality specifically mentioned in Ayurvedic classics for the management of fistula-in-ano can be adopted in synechiae as the condition is to be managed by separating the adhesion in which we can find two openings either superiorly and inferiorly or medially and laterally [4].

Kshara Sutra is a medicated thread (seton) coated with herbal alkaline drugs like Apamarga Kshara (ash of Achyranthes aspera), Shuni (Euphorbia nerifolia), latex, and Haridra (Curcuma longa) powder in a specific order. This combination of medicines on the thread helps in debridement and lysis of tissues, exerts anti-fungal, anti-bacterial, and anti-inflammatory actions [5].

2. Case report

A 48-year-old, moderately built male patient came to ENT OPD with complaints of severe blocked nose and difficulty in breathing...
associated with mild anosmia. On examination left maxillary sinus
tenderness was present. Anterior rhinoscopic examination showed
presence of nasal synechiae on left nostril which resulted from
adhesion of inferior turbinate with nasal septum which was then
confirmed with endoscopic examination. He had a history of nasal
blockage for which he took allopathic consultation and was advised
for electrocautery. Patient was not willing to undergo electrocau-
dery due to high chance of recurrence and hence a new way to cut
open the synechiae was sought. Application of Kshara Sutra fol-
lowed by nasal packing with Apamarga ksharatalam and nasavarthi
(nasal splinting with medicated wick) using Ghondaphaladi varthi
was planned. Kshara Sutra was aimed at cutting open the synechiae,
nasal packing with Apamarga ksharatalam in preventing further
adhesion and for proper healing and Ghondaphaladi nasavarthi for
further cutting of tissues and proper healing as in case of naa-
divrana (sinus ulcers). Kshara Sutra was applied and the thread was
tightened every 4th day. After 3 weeks (6 sittings) the synechiae
was fully cut open after which nasal packing with Apamarga
ksharatalam was carried out for 7 days. Later, Nasavarthi was kept
in the space between the inferior turbinate and septum of left
nostril for two weeks. Table 1 represents the detailed timeline of
the treatment.

2.1. Poorvakarma (Pre-procedure)

LOX 10% spray was sprayed in the left nasal cavity to anaes-
theticize the synechiae and nasal mucosa. All the aseptic precautions
were maintained throughout the procedure.

2.2. Pradhanakarma (Procedure)

A long metallic malleable probe [Fig. 1] was introduced through
the inferior opening and attempted to pass the tip of probe through
the superior opening. Care was taken not to create false passage. One
end of probe was threaded with Kshara Sutra and passed through the
inferior portion of synechiae and taken through the superior portion
with needle holding forceps. Then the probe was gently withdrawn,
so the entire tract was threaded with medicated Kshara Sutra. The
two ends of the thread were then comfortably tied using two knots
on the inferior aspect of synechiae [Fig. 2].

2.3. Paschat karma(Post-procedure)

The part of the thread extending from the knots was carefully
covered with gauze pad and nasal packing was done to prevent
contact of Kshara Sutra with septum and lateral wall of nose. Proper
care was taken to prevent further synechiae formation resulting
from contact of mucosal surfaces of septum and turbinates. On
every fourth day, thread was changed and the procedure was
continued for 3 weeks until the synechiae was fully cut open.
Apamarga ksharatalam (1 week) and Ghondaphaladi nasavarthi (2
weeks) was also done as post-procedure after Kshara Sutra.

2.4. Follow up

Follow-up was done once in a month for 6 months. In every
follow-up visit, endoscopic examination was done along with
anterior rhinoscopic examination to check for recurrence of syn-
echiae. No recurrence was noticed up to 6 months. Patient had
marked relief in symptoms like nasal blockage and difficulty in
breathing which sustained throughout the follow-up period. Later,
7th and 8th follow-up was carried out once in 3 months and the
patient was symptom-free.

3. Discussion

Kshara karma is being widely practiced now-a-days in Shalakya
rogas (diseases pertaining to region above neck) like tundikeri
(tonsillitis), nasarshas (nasal polyp) and nasa pratinitaha (turbinate
hypertrophy). In all these conditions, Apamarga Kshara (alkali
prepared out of A. aspera) or Tankana Kshara (borax) is the drug of
choice. No reference for similar condition like nasal synechiae is
available in Ayurvedic classics. Kshara applications like that on
nasal polyp is not feasible here since there is chance of recurrence
of synechiae. Also, the posterior extend of synechiae was not visible
with endoscopic examination and hence, the normal kshara
procedure was thought to be insufficient in this case.

It is an accepted fact, based on various studies, that average unit
cutting time with Kshara Sutra is 1 cm/week in fistula-in-ano and
the Kshara Sutra is therefore changed once a week. In our case, we
have tightened the Kshara Sutra every fourth day. The unit cutting
time depends on various factors like the concentration of the drug,
tissue of the tract and pressure applied by the
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| No. | Treatment adopted          | No of days                      | Outcome                  |
|-----|---------------------------|--------------------------------|--------------------------|
| 1   | Kshara Sutra              | Total- 3 weeks (6 sittings)     | Synechiae cut open       |
|     |                           | Thread tightening- every 4th day|                          |
| 2   | Apamarga Ksharatalam      | 7 days                         | Wound healed completely  |
| 3   | Ghondaphaladi             | 14 days                        | Proper spacing of the nasal passage |
|     | Nasavarthi                |                                |                          |
4th day was repeated till the *Kshara Sutra* got cut through the tract completely and the duration of procedure depended only on extent of adhesion.

The *Kshara Sutra* threading is a minor procedure and could be carried out at OPD level. The expenses required for this procedure are very low and there is no need to hospitalize the patient for longer duration. The standard *Kshara Sutra* is prepared by 11 coatings of *Snuhi* latex (*E. nerifolia*), 7 coatings of *Snuhi* latex and *Apamarga Kshara* (*A. aspera*) and last 3 coatings of *Snuhi* latex and *Haridra Churna* (*C. longa*) [6]. The *Apamarga Kshara Sutra* is well-proven to be an effective treatment for the management of fistula-in-ano. It has been standardized by Central Council for Research in Ayurvedic Sciences (an apex research organization of Government of India) in the field of Indian systems of medicine [7]. *Snuhi Ksheera* possesses *Shodhana* as well as *Ropana* properties. Considering the Rasa Panchaka of the drugs, *Apamarga*, *Snuhi*, and *Haridra* all are possessing *Katu* and *Tikta*; *Ushna -Virya*; *Katu -Vipaka* and *Kapha-Pitta Shamaka* properties.

Since the procedure was under local anaesthesia by LOX 10% spray, there was only bearable pain sensation even after the procedure. The thread was not tightened similar to *Kshara Sutra* in fistula-in-ano as only *ksharana* or necrotizing tissue was aimed instead of *ksharatana* and *chedana* as in case of bhagandhara. Also sitz bath like procedure for pain management adopted during thread changing in fistula-in-ano was not necessary since every thread change was carried out after local anaesthesia.

Nasal packing with *Apamarga ksharatailam* helps in shrinkage of the thickened mucosal area thereby increasing the cavity space [8]. *Ghondaphaladi varthi* is mentioned in *Susrutha Samhitha nadeevrana chikitsa* and was prepared with *Ghondaphalatwak* (*Ziziphus xylopyrus*), *pancalavana* (rocksalt/sodium chloride, lakesalt, blacksalt, sodi muras, and unaqua sodium chloride), *laksha* (*Laccifer lacca*), *pugiphala* (*Areca catechu*), *patram* (*Cinnamonum zeylanicum*) and *ksheera* (latex) of *snuhi* (*E. nerifolia*) and *arka* (*A. aspera*) [9]. The powdered drugs were mixed with *ksheera* of *arka* and *snuhi* and *varthi* of suitable size to be kept in the cut space was prepared and dried [Fig. 3]. All drugs are having *lekhana* and *ropana* properties and the *varthi* was used as *nasavarthi* helped in further increasing the space of nasal cavity and proper healing of the cut open wound [Fig. 4]. X-Ray PNS taken after this procedure shows left maxillary sinus was intact with clear nasal cavity [Fig. 5].

In previous studies comparing the efficacy of Mitomicin C and Teflon Nasal Septal Splint in treating and preventing recurrence of nasal synechiae after surgical synechiolysis, follow-up evaluation was done in 1 week, 1 month, 2 months [10]. However, in this case, the follow-up was done once in a month for 6 months and no
recurrence was noted within that period. Symptoms of nasal blockage and breathing difficulty were markedly reduced and anosmia was completely relieved. Later, on 7th and 8th follow-up (once in 3 months) the patient was symptom-free.

4. Conclusion

Nasal synechiae is a condition with considerable incidence despite of the emergence of various preventable measures adopted post-operatively like septal splints, nasal packings, application of mitomycin-C etc. Kshara Sutra in management of nasal synechiae will be a breakthrough as it is a condition which was thought to be managed only by surgical correction or cauterization.

Patient consent

Consent for publication of this case study has been obtained from patient.

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Conflict of interest

None.

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