



CLINICAL EVALUATION AND SURGICAL OUTCOMES OF THE SUPRA AURICULAR APPROACH USING A MODIFIED MICRO DISSECTION NEEDLE IN PREAURICULAR SINUS EXCISION: A COMPREHENSIVE REVIEW OF 40 CASES ACROSS ANATOMICAL VARIANTS

Otorhinolaryngology

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ABSTRACT

Introduction: Preauricular sinus is a congenital malformation originating from incomplete ectodermal fusion of the Hillocks of His during embryonic auricular morphogenesis, presenting with intricate subcutaneous ramifications tightly anchored to the helical perichondrium. **Methodology:** A prospective observational study evaluated 40 patients (50 sinus tracts) undergoing radical en-bloc excision via the supraauricular approach using a low-power (15–20 W) Modified Microdissection Needle (MMDN) across a post-operative follow-up period ranging from 3 to 12 months. **Summary of report:** The patient cohort demonstrated a mean age of 21.8 years with a female-to-male ratio of 1.35:1; classical preauricular presentations comprised 54% (n=27) of sinus tracts, whereas variant anatomical distributions (crural, postauricular, helico-lobular) accounted for 46% (n=23). Principle result: Operative resections averaged 20 minutes (range: 15–28 minutes), resulting in a zero disease recurrence rate (0/50 tracts, 0%) and a minor surgical site infection rate of 4% (n=2), which completely resolved with conservative culture-guided management. **Conclusion:** The supraauricular approach combined with the MMDN offers optimal anatomical exposure, minimal tissue charring, zero recurrence, and superior cost-effectiveness for managing preauricular sinuses across all anatomical variations.

KEYWORDS

Electro Cautery, Modified Microdissection Needle, Preauricular Sinus, Supraauricular Approach, Surgical Site Infection

INTRODUCTION

Preauricular Sinus (PAS) is a blind ended sinus tract lined with stratified squamous epithelium presenting commonly in front of helix which developed from defective or incomplete fusion of ectodermal Hillock of His during auricular embryogenesis from first bronchial arch during 6th week of gestation (Intertubular hypothesis of His)^[1]. A sinus results when one of the sulci incompletely disappear or form an isolated ectodermal folding during pinna morphogenesis^[2].

It can be sporadic or inherited, unilateral or bilateral, can present with multiple sinus tract or even more than one fistula predominantly over preauricular skin tag. Right-side appears to be more often involved and female preponderance is more^[3]. It can be inherited autosomal dominant type with incomplete penetrance in case of familial type.^[4,5] It can be component of multiple syndrome, most notably Branchio-oto-renal syndrome which is autosomal dominant with variable penetrance.

Classification

I) Congdon et al. suggested various location of PAS.^[4]

- Pre-auricular type
- Marginal helicine type
- Crural type
- Posterior helicine type
- Post-auricular type
- Helico-lobular type
- Central lobular type

II) Choi et al. divided PAS into 2 types^[5]

- Classical type
- Variant type
 - Type 1 (postero- medial direction)
 - Type 2 (postero- inferior direction)

Presentations

Most commonly PAS is asymptomatic but it may get infected leading to discharging sinus and surrounding tissue inflammation, even leading to preauricular lymphadenitis and abscess formation . The most common pathogens causing infection are Staphylococcus species and less frequently Proteus , Streptococcus etc.

Spontaneous rupture or surgical drainage of these abscesses damages surrounding skin, resulting in secondary scarring, complex ramifications, post-aural fistula or epithelial retention cyst.

The structure presents as a simple epithelial invagination into the

auricular stroma. Due to the ramifications within the stroma superiorly, medially and superficial to temporalis fascia^[6] while remaining tightly bound to the perichondrium of the helical cartilage, it has high propensity to recur even after surgical removal.

As the distal ramifications of sinus tract are in close anatomical proximity with the temporal division of facial nerve it can sometimes lead to facial nerve injury during repeated sinus disruption and seeding. Furthermore chronic inflammation is an important risk factor for carcinogenesis, thus a squamous cell carcinoma-ex-preauricular sinus may develop.

Management

No treatment is required in case of asymptomatic pre auricular sinus.

In case of active infection -discharge, abscess formation, local pain and tenderness and discoloration of skin can be seen. Abscess may burst out resulting in skin loss. These cases are managed with culture based Antibiotic therapy, Analgesic, Incision and Drainage of abscess and local wound dressing.^[7]

Surgical management dynamics

If the sinus tract is symptomatic , local excision during quiescent phase is the treatment of choice. It includes Curettage, Sinusectomy using methelene blue dye and surgical loupe, Micro dissection and wide local excision (Inside-out technique) or The Prasad's modified Supraauricular Approach (SAA)^[7,8,9].

Supraauricular Approach (Fig 1)^[9]

In 1990, Prasad et al. described the SAA to PAS which is an en-block radical wide local excision of PAS which is based upon the theory that "Fistula is almost always included in subcutaneous tissue between temporalis fascia and perichondrium of helical cartilage and posterior to parotid fascia". The resultant excision is considered to give lowest recurrence rate.

Elliptical Incision is extended higher upwards to the pre and Supra auricular temporal region which allows better surgical exposure without adverse aesthetic consequences.

Dissection proceeds identifying not only the tract but the space in which it develops lateral to temporalis fascia, until reaching helical cartilage posteriorly and normal parotid parenchyma anteroinferiorly. All the soft tissue comprising sinus tract, cyst, it's ramifications, as well as the portion of cartilage along with its perichondrium is removed. The opening is then closed with a purse string suture after thorough irrigation of the field.



Fig 2.1

TECHNICAL INNOVATION: MICRODISSECTION NEEDLE
The SAA is generally being carried out using a Microdissection Needle such as Colorado tip (Fig 2.1).



Fig 2.1

The use of electro cautery dated back to 1909.^[10] The principle is to deliver highly localized heat to the tissue occurring by formation of minute arc between the finer needle tip and the moist tissue. Ultra-fine tungsten alloy tip has a reduced power requirement in electro cautery to almost 5-8 W from 30-40 W.

These microdissection needles has a property of higher melting point and sharper tip leading to less dissipation of energy, smaller zone of necrosis, lesser damage to adjacent tissue ,faster healing and minimal scarring .

But this kind of needle is single use only and commercially available variants like Strykers Colorado tip are very costly for developing and resource constraint country like us.

Modified Microdissection Needle(MMDN), developed by Singh & Kumar and refined by Sahu & Midya^[10,11] is a standard cost effective self made alternative of standard Colorado tip.

Creation of MMDN (Fig 2.5) requires^[11,12] :

1. Standard 22 gauge disposable hypodermic needle 0.7 mm outer diameter (Fig 2.2)



Fig 2.2

2. 8 Fr. Infant feeding tube (Fig 2.3)



Fig 2.3

3. Monopolar electrosurgical pencil (Fig 2.4)



Fig 2.4

The hypodermic needle shaft is separated from its plastic hub using an artery forceps, taking care to prevent needle stick injury. The needle shaft is placed directly against the monopolar tip. Infant feeding tube is cut to serve as an insulating sleeve sliding over the assembly. Only the terminal 2mm to 3 mm of the needle tip is exposed. This sleeve provides a snug fit preventing power loss, mechanical instability or the

lateral electrical arc formation. The needle can be bent to desired angle and the electro cautery generator is operated at low power setting of 15-20 W.



Fig 2.5

OBJECTIVES OF THE STUDY

1. General Objective

To demonstrate use of MMDN in management of PAS in SAA for successful outcome

2. Specific Objectives

a. To show the efficacy of SAA in terms of

I. Exposure

II. Reduced recurrence

b. To demonstrate MMDN as an effective alternative to microdissection needles in PAS excision.

METHODOLOGY

Our study was a Prospective Observational study placed in Department of ENT and Head Neck Surgery of a Tertiary Care Centre over Indoor patients admitted with PAS for surgery from June 2022-December 2025

Sample size- Number of patients (N)=40

Sample size (n)=50

Inclusion criteria-

- Patients clinically diagnosed with PAS irrespective of age and sex
- Patients who gave informed consent to get involved in the study and underwent surgical excision

Exclusion criteria-

- Patients with active infection
- Patients who refused surgical treatment
- Patients who are unfit for surgery
- Patients with syndromes associated with PAS

Methodology

- After selection of the admitted patient with PAS according to Inclusion criteria, Pre-anesthetic work-up done
- Operated by SAA using MMDN under local or general anesthesia
- Diathermy current was kept low (around 15-20 W)
- Tight suturing was done using 3-0 vicryl or ethylon
- All patients were followed up for a minimum of 3 months to 12 months postoperatively to look for surgical site infection and recurrence

RESULTS AND ANALYSIS DEMOGRAPHIC PROFILE

- Age -Range 3 years to 49 years, mean age of 21.8 years .
- Male (N=17) : Female (N=23) - 1:1.35

LATERALITY OF THE DISEASE

All 10 bilateral cases (N=10; 25%) have positive family history. Unilateral PAS (N=30; 75%) presents with left sided predominance (N=17; 42.5%).

SITE OF PAS

Table 1

Congdon Type	Choi Type	Sinus tract count(n=50)	Percentage
Type A (Fig 4.4) & B (Fig 3.1)	Classical Type	27	54%
Type C (Fig 3.2)	Variant Type	12	24%
Type D	Variant Type	2	4%
Type E	Variant Type	5	10%
Type F	Classical Type	3	6%
Type G	Classical Type	1	2%
Total Tracts	Classical/Variant (31/19)	50	100%



Fig 3.1



Fig 3.2

PREOPERATIVE CLINICAL PRESENTATION :

Table 2

Outcome parameter	
Mean operative time	20min (15-28min)
Surgical site infection (SSI)	2 cases (4%, n=50)
Disease recurrence rate	0 cases (0%, n=50)
Follow up duration	6 months (3-12 months)



Fig 4.1



Fig 4.2



Fig 4.3



Fig 4.4

OPERATIVE AND POST-OPERATIVE OUTCOMES:

Table 3

Outcome parameter	
Mean operative time	20min (15-28min)
Surgical site infection (SSI)	2 cases (4%, n=50)
Disease recurrence rate	0 cases (0%, n=50)
Follow up duration	6 months (3-12 months)

HEALING IN CASE OF SSI:

Post operative SSI occurred in 2 patients where clinical evaluation revealed that they had predisposing factors like tissue scarring from prior infection, preoperative blood glucose fluctuation in one diabetic patient. They respond to conservative management i.e local wound dressing culture guided systemic antibiotic and glycemic control. Secondary wound healing achieved (shown in Fig 5) within 3 weeks without requiring revision surgery.



Fig 5



INTRAOPERATIVE PICTURES OF SAA

Steps: Marking of incision line (Fig6.1), dissection and en-bloc resection (Fig6.2), hemostasis and post resection status (Fig6.3), wound closure (Fig6.4)



Fig6.1



Fig6.2



Fig6.3



Fig6.4

Fig6.5 (Composite specimen)

DISCUSSION

PAS, a developmental anomaly, commonly presented with a discharging sinus- in pre auricular region. Among 40 patients, 23(57.5%) was females and rest 17(42.5%) are males with a mean age of presentation being 21.8 years. Total number of PAS were 50 with incidence of bilateral, right sided and left sided PAS were 25%, 32.5%, 42.5% respectively. In our study, 54% of PAS belongs to Congdon

classical Preauricular and Marginal helicine type. Second most common (24%) was Crural type. Cho Y Z, Min H J, Kim K S in their study found - anterior helicine to be the commonest (80-90%) and crural type could be the second commonest (10-15%)^[13]

22 (44%) PASes had associated scar which were the result of antecedent Preauricular abscess. Only the 12% had post aural fistula and 18% PAS had associated cyst.

All patients were operated using SAA with MMDN. Average time taken to complete the surgery was 20 min. SSI was seen in 2 case due to poor glycemic control. No recurrence was noted till 12 months of post operative follow up reflecting findings of studies by Lam et al^[6]. Similar low recurrence rate was evident in findings of Prasad et al^[9]. MMDN are a good alternative to a standard Costlier microdissection needle with minimal bleeding, less tissue charring and appreciable aesthetic outcome^[11]. The low cost construct and good applicability were supported by studies of Sahu R, Midya M and Singh R, Kumar P who used MMDNs extensively with similar benefits, direct with some distinct disadvantages including less control of instrument due to increment of tip to shaft distance, needle stick injury and instability of needle cautery assembly^[11,12].

Most of the study findings corroborated with the existing literatures. Furthermore, the use of MMDN, although common in - various Head Neck surgeries during Incision making. Extensive use of same is novel in PAS excision. This will pave the pathway of its use as well as gain critical remarks among surgeons and authors in future.

CONCLUSION

1. Supra-auricular approach is simpler, easy to perform, provides wide exposure and effective in terms of reduced recurrence and appreciable cosmesis.
2. MMDN is a good alternative to Microdissection needle (Colorado tip) with minimal bleeding and less tissue damage.
3. Strict glycemic control in peri-operative period is necessary for proper wound healing and faster recovery.

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