

# Supra-auricular versus Sinusectomy Approaches for Preauricular Sinuses

Mohammad Waheed El-Anwar<sup>1</sup> Ahmed Shaker ElAassar<sup>1</sup>

<sup>1</sup>Department of Otorhinolaryngology - Head and Neck Surgery, School of Medicine, Zagazig University, Zagazig, Egypt

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Address for correspondence Mohammad Waheed El-Anwar, MD, Department of Otorhinolaryngology - Head and Neck Surgery, School of Medicine, Zagazig University, Zagazig, Zip code 0020552309843, Egypt (e-mail: mwenteg@yahoo.com).

## Abstract

**Introduction** Several surgical techniques and modifications have been described to reduce the high recurrence rate after excision of preauricular sinus.

**Objectives** The aim of this study is to review the literature regarding surgical approaches for preauricular sinus.

**Data Synthesis** We performed searches in the LILACS, MEDLINE, SciELO, PubMed databases and Cochrane Library in September, 2015, and the key words used in the search were “preauricular sinus,” “sinusectomy,” “supra-auricular approach,” “methylene blue,” and/or “recurrence.” We revised the results of 17 studies, including 1270 preauricular sinuses that were surgically excised by sinusectomy in 937 ears and by supra-auricular approach in 333 ears. Recurrence with supra-auricular was 4 (1.3%) while sinusectomy was 76 (8.1%) with significant difference ( $p < 0.0001$ ). There were no reported facial nerve paresis or paralysis in any of the approaches. The sinusectomy approach showed significantly more complications ( $p = 0.0048$ ).

**Conclusion** Supra-auricular approach had significantly less recurrence rate than tract sinusectomy approaches. Thus, it could be regularly chosen as the standard procedure for preauricular sinus excision. As such, it would be helpful for surgeons to be familiar with this approach.

## Keywords

- ▶ recurrence
- ▶ preauricular fistulae
- ▶ facial nerve

## Introduction

Preauricular sinuses (pits) are common congenital abnormalities that were first described in 1864 by Heusinger.<sup>1,2</sup> The malformation is associated with either a defect in the first branchial arch development during the sixth week of gestation<sup>3</sup> due to incomplete fusion of the six auditory hillocks of His, or with the sinus developing during embryonal auricular development from an isolated ectodermal folding, a less accepted hypothesis.<sup>2</sup>

Classically, a preauricular sinus presents as a small opening, usually near the anterior limb of the ascending helix, although most preauricular sinuses are found anterior to the external auditory canal.<sup>2</sup> A small percentage has been reported and located in other areas such as the superopos-

terior edge of the helix, the tragus, the lobule, the ascending helix crus, supra-auricular area, and the postauricular area.<sup>4–8</sup>

Preauricular sinuses are usually asymptomatic, isolated, and require no treatment. However, if infected, these sinuses become painfully swollen with offensive discharge. Given that preauricular sinuses may be associated with hearing and renal anomalies, auditory testing and renal ultrasound are useful in patients presenting associated syndromes.<sup>9–11</sup>

Complete excision of the sinus sac or fistula is ideal in treatment.<sup>1,6</sup> However, even if excision is performed by experienced surgeons, recurrence can still occur after excision.<sup>4</sup> Several surgical techniques have been used for total excision of preauricular sinuses to avoid recurrence:

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## Sinusectomy Approaches

- (a) **Classic simple sinusectomy using lacrimal probe.** Under general or local anesthesia, an elliptical incision is done parallel to the edge of the anterior helix including the sinus opening. Gentle probing with a blunt ended malleable probe is done first to delineate the extent and presence of multiple ramifications. All ramifications are meticulously dissected and totally excised.<sup>12</sup>
- (b) **Classic simple sinusectomy using methylene blue.** Elliptical incision is done parallel to the edge of the anterior helix including the sinus opening. Methylene blue injection is used as a guide for tracing and excising the complete sinus, including its surrounding soft tissue.<sup>13</sup>
- (c) **Classic simple sinusectomy using microscopy or magnifying glasses (inside-out technique).** This technique was first described in 2005 by Baatenburg de Jong,<sup>14</sup> but was first introduced by Jesma in Rotterdam in the 1970s (not published at that time). This method involves a small elliptical incision around the sinus pit. Stay sutures are placed to facilitate dissection of the tract and the sinus is opened. The sinus tract and its branches are then followed from the inside and outside.<sup>15</sup>

## Supra-auricular Approaches

- (a) **Parasad technique of supra-auricular approach.** The elliptical incision used is extended down to the superior end of the tragus and up parallel to the anterior edge of the anterior helix. The incision is deepened till the temporalis fascia is identified as a medial limit of the dissection. The dissection continues over the cartilage of the anterior helix. The base of the sinus attached to the perichondrium of the anterior helix is excised with the perichondrium to ensure complete excision of the epithelial lining.<sup>12</sup>
- (b) **Fig. 8 incision with extended fistulectomy.** For cases with fistulae formation, Huang et al<sup>13</sup> performed the Fig. 8 incision with extended fistulectomy under general anesthesia. This surgical method consists of two wedge incisions: one includes the sinus opening and the other includes the abscess openings and surrounding necrotic skin. The surgeon then elevates the skin flap and dissects along the perichondria of the ear down to the temporalis fascia and removes all of the inflamed tissue en bloc, including the sinus or fistula tract. The use of microscopy or glasses in this technique is an option. The Fig. 8 incision method can preserve more intact skin than the large wedge excision can, attaining a better cosmetic result.<sup>13</sup>

The aim of this study was to review, collect, and analyze the published results of each technique.

## Review of Literature

We conducted a search in the LILACS, MEDLINE, SciELO, PubMed, and Cochrane Library databases in September 2015, and used "preauricular sinus," "sinusectomy," "supra-auricular approach," "methylene blue," and/or "recurrence." We searched for studies published after 2001.

We collected all methods of preauricular tract(s) identification and excision and their modifications and referred to them as sinusectomy approaches. We also gathered studies that used the supra-auricular approach as described by Prasad et al, referring to them as supra-auricular approaches. We collected, tabulated, and analyzed the results. Then, we performed a statistical analysis and comparison using SPSS 14.0 statistical software for Windows (SPSS Inc., Chicago, IL). The significance level was set at  $p$  less than 0.05.

We revised seventeen studies and the results of 1270 surgically excised preauricular sinuses: 937 by sinusectomy techniques and 303 by supra-auricular approach (–Table 1).<sup>4,12-27</sup> Recurrence with supra-auricular was 4 (1.2%) and with sinusectomy was 76 (8.1%) with a highly significant difference ( $X^2 = 19.874$ ;  $p < 0.0001$ ) (–Table 2).

None of the approaches reported major complications such as facial nerve paresis or paralysis. Of the sinusectomy approach cases, there were 4 dehiscence wounds (0.43%), 10 infections (1.06%), 14 bad scars (1.5%) documented, whereas only one operated preauricular sinus (0.3%) by supra-auricular approach reported infection with no scar or wounds. Total reported complications resulting from the sinusectomy approach was 28 ears (3%) and one ear (0.3%) from the supra-auricular approach. Therefore, the sinusectomy approach showed significantly more complications ( $X^2 = 7.955$ ;  $p = 0.0048$ ).

## Discussion

Recurrence after excision of preauricular sinus is a result of incomplete excision of the sinus tract and presence of residual viable squamous epithelium.<sup>28</sup>

The real problem in the surgical removal of preauricular sinus is the high recurrence rate following sinusectomy techniques due to tortuous tract course<sup>12</sup> and the high variability and number of sinus ramifications,<sup>12,24</sup> particularly of the terminal ramifications, which are difficult for the surgeon to follow,<sup>12</sup> and especially upwards and medially.<sup>24</sup> Furthermore, infectious episodes, possibly with abscess, can induce scars that further alter the sinus route and courses.<sup>18</sup> Recurrences result from the difficulty during sinusectomy to follow the tract and its branches. Pre- and intraoperative precautions are often not sufficient to guarantee there is no recurrence, which remains high.<sup>17</sup>

Although there are several tools and methods used for proper tract(s) identification, such as the use of methylene blue, probing, microscope, or magnifying glasses.<sup>14,15</sup> Nonetheless, recurrence remains of significant concern.

Based on the theory that a preauricular fistula is almost always found in subcutaneous tissues between the temporalis fascia and perichondrium of the helical cartilage, the supra-auricular approach proposed by Prasad et al in 1990 is assumed to have a lower recurrence risk.<sup>17</sup> The supra-auricular technique is based on identification of the temporalis fascia (medial border of the dissection) and the cartilage of the helix and auditory canal (posterior border of the dissection). Subsequently, the surgeon performs an en bloc resection of the sinus,<sup>16</sup> removing all subcutaneous tissue between the temporalis fascia and the helix through a postauricular

**Table 1** Recurrence among different studies

Study	Year	Number of ears/ approach	Recurrence	
		Sinusectomy or its modifications	Supra auricular	
Lam et al <sup>12</sup>	2001	25	–	8
		–	27	1
Vijayendra <sup>16</sup>	2005	–	36	0
Baatenburg de Jong <sup>14</sup>	2005	40	–	2
Yeo et al <sup>4</sup>	2006	206	–	10
Hassan and Samir <sup>17</sup>	2007	30	–	10
		–	33	3
Tang et al <sup>18</sup>	2007	73	–	10
Leopardi et al <sup>19</sup>	2008	–	6	0
Bhandary et al <sup>20</sup>	2009	77	–	2
Bae et al <sup>21</sup>	2012	–	101	0
Gan et al <sup>15</sup>	2013	208	–	5
Huang et al <sup>13</sup>	2013	79	–	8
		–	30	0
Tariq et al <sup>22</sup>	2013	30	–	3
Kavuturu et al <sup>23</sup>	2013	–	34	0
Mundra et al <sup>24</sup>	2014	–	15	0
Bhandari et al <sup>25</sup>	2014	–	51	0
Goel et al <sup>26</sup>	2015	112	–	18
Yoo et al <sup>27</sup>	2015	57	–	0

extended incision. Thus, there is no need to identify the entire sinus tract and its branches.<sup>12,17</sup>

Thereafter, Lam et al,<sup>12</sup> in his comparative study, found a significant difference in recurrence rates between the classic sinusectomy technique and the supra-auricular approach (32% and 3.7%, respectively).

We analyzed the published operated preauricular cases since Lam et al<sup>12</sup> and collectively found that recurrence rate was 4/333 (1.2%) with the supra-auricular approach, and 76/937 (8.1%) with various sinusectomy approaches with statistically significant difference in favor of the supra-auricular approach (► **Table 2**).

Even though, the sinusectomy relied on magnification,<sup>25</sup> which was not employed in any previous study on the supra-auricular approach, recurrence was significantly minimized<sup>12,17</sup> and even not encountered<sup>16,19,21,23–25</sup> after the supra-auricular approach. This demonstrates that the supra-auricular approach is highly effective and successful.

The supra-auricular approach was also described as a simple, less time consuming approach and shows fewer difficulties<sup>12,16,17,19,24,29</sup> because it does require the surgeon to isolate and follow the sinus branches, as in the sinusectomy technique and its modifications but simply identify a surgical plane such as the temporalis fascia.<sup>25</sup> Moreover, it carries a risk of injury of the facial nerve or any important structure, with a low risk of scar formation. That is why our statistical analysis of reported complications detected that the supra-auricular approach causes significantly ( $p = 0.0048$ ) less complications (0.3%) than sinusectomy (3%).

Since this kind of surgery is often performed by relatively inexperienced surgeons, the supra-auricular approach may represent a further guarantee of preventing recurrences as it does not require a learning curve. It is less time consuming and can be done under local anesthesia.

The supra-auricular approach is simple, effective, with negligible recurrence. Thus, it is better to be used regularly

**Table 2** Statistical analysis of recurrence rate difference between supra-auricular and sinusectomy approaches

Approach	Number of ears	Recurrence	Chi square test	p value
Supra auricular	333	4 (1.2%)	19.874	< 0.0001 HS
Sinusectomy or its modifications	937	76 (8.1%)		

Abbreviations: HS; highly significant.

as a standard procedure for preauricular sinus excision, especially because it has shown no significant complications and less post-operative scar formation<sup>18</sup> with no need for extra tools as microscope and loops. Moreover, it is the ideal technique for recurrent cases or cases undergoing sinus-ectomy after abscess incision and drainage.

Studies to compare supra-auricular approach and sinus-ectomy approaches for preauricular sinus excision in bilateral cases by the same surgeon are still needed.

## Final Comments

Supra-auricular approach had a significantly lower recurrence rate than tract sinus-ectomy approaches. Thus, it is a good option as a standard procedure for preauricular sinus excision, It is especially useful as an alternative in cases where the sinus-ectomy approaches are difficult to be performed. Therefore, it would be helpful for surgeons to be familiar with this approach.

### Conflict of Interest and Financial Disclosure Statement

The authors declare no financial support or conflict of interest in this study.

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