Surgical Outcomes of Sinonasal Inverted Papillomas in Songklanagarind Hospital

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Objective: *To evaluate the surgical outcomes and recurrence rate of inverted papillomas (IPs).*
Material and Method: *The medical records of patients diagnosed as IPs at Songklanagarind Hospital between January 2004 and December 2012 were retrospectively reviewed. Demographic data, clinical presentation, type of surgical approach, complications, and recurrence status were collected.*
Results: *From 64 patients, 75% were male. The average age was 55 years. IPs were classified in Krouse's classification system as followed: stage I = 6.3%, stage II = 21.9%, stage III = 70.3%, and stage IV = 1.5%. The surgical approaches were divided into endoscopic endonasal approach (EEA) 60.9%, EEA combined with external approach 35.9%, and external approach 3.2%. Complications such as synechea and maxillary sinus ostium stenosis occurred in 29.7% of patients. Thirty-seven point five percent had disease recurrence after surgery, most commonly at the frontal sinus 82.4%, and sphenoid sinus 60%.*
Conclusion: *EEA is an effective treatment for IPs, especially in Krouse's classification stage I, II. The external approach combined with EEA could be useful when the tumor extends to the anterolateral wall of the maxillary sinus. Finally, the surgeon must pay particular attention to the frontal and sphenoid sinus because of the high local recurrence rate.*

Keywords: *Surgical outcome, Benign tumor of the nasal cavity, Inverted papillomas*

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The inverted papillomas (IPs) are relatively uncommon benign sinonasal tumors with an incidence of 0.5 to 1.5 cases per 100,000 per year[1], and approximately 0.5 to 4% of all sinonasal tumors[2]. The male to female ratio is between 3:1 and 5:1, and patient age ranges from 6 to 89 years (average 53 years)[3]. The clinical problems of IPs are a tendency towards local destruction, recurrence, and malignant transformation[4].

From a prognostic standpoint, many staging systems for IPs have been proposed, Krouse's classification is the most popular staging system based on endoscopic and computed tomography examination[5].

Nowadays, surgery is the treatment of choice for IPs; it aims to remove the disease completely. Current surgical approaches are generally divided into endoscopic and external approaches, depending on the extent of the disease, the skill of the surgeon and the available technology[6]. The options comprise of: 1) endoscopic endonasal approach (EEA), 2) limited external approach (e.g., Caldwell-Luc), 3) radical external approach (e.g., medial maxillectomy via lateral rhinotomy or midfacial degloving), and 4) a combination of the EEA and external approaches[7]. During follow-up, most recurrence occurs within 3 years after initial treatment (mean 30 months)[8].

There are no previously published studies on the surgical outcomes of IPs based on Krouse's classification and the type of surgical approach used in the Thai population; thus, the authors present the evaluation of the surgical outcomes, recurrence rate, and the high-risk anatomical areas of recurrence in order to improve the management of these challenging tumors.

Material and Method

The 64 patients diagnosed with IPs at Songklanagarind Hospital between January 2004 and December 2012 were retrospectively reviewed after proper approval by the Hospital Ethics Committee. The demographics, clinical presentation, sinus involvement, surgical procedure performed and associated complications, occurrence of associated malignancy, and disease recurrence were recorded for each patient; minimum follow-up was three months.

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Table 1. Staging systems for IPs in Krouse's staging system[5]

Stage	Characteristics of tumor and extension
I	Confined to the nasal cavity
II	Osteomeatal complex region, ethmoid, or medial maxillary involvement
III	Any wall of maxillary but medial, frontal, sphenoid sinus with or without stage II criteria
IV	Any extrasinus involvement or malignancy

All the patients underwent preoperative CT scan and were divided into four staging groups, based on the Krouse's classification (Table 1).

Statistical analysis

The descriptive statistic such as means, standard deviation (SD), frequency, and percentage of all values were calculated with R Software version 2.13.1.

Results

Sixty-four patients were reviewed. There were 48 male and 16 female patients (male to female ratio of 3:1).The mean age was 55 (range of 33 to 90) years. There were 30 left-sided lesions, 32 right-sided lesions, and two bilateral lesions. The mean follow-up for all patients was 19 months (range of 3 to 85 months).

The most frequent signs and symptoms were nasal obstruction, which was found in 85.9% of cases, nasal mass 6.2%, epistaxis 4.7%, rhinorrhea 1.6%, and nasal pain 1.6%. In the imaging study, the CT scans were performed on all patients, and, according to Krouse's classification, four patients (6.3%) were in stage I, 14 patients (21.9%) in stage II, 45 patients (70.3%) in stage III, and one patient (1.5%) in stage IV (squamous cell carcinoma) (Table 2).

Surgical approaches were divided into EEA, external approach, and EEA combined with external approach, according to each group in Krouse's classification staging (Table 3).

Tumor recurrence occurred in 24 (37.5%) of 64 cases (Table 4). Recurrence occurred on average after 7.5 (range of 1 to 36) months. The stage distribution of these patients was one patient in stage I, two patients in stage II (all managed with EEA), 18 patients in stage III. In this group, 14 patients were managed with EEA, three patients were managed with EEA combined with external approach, and one patient was managed with external approach. The one patient in stage IV also had disease recurrence (Table 5).

The involved sites were categorized into eight groups, and the recurrence rate according to each involved site was calculated (Table 6). The most common site of recurrence was the frontal sinus with 14 (82.4%), followed by the sphenoid sinus with three (60%).

Table 2. Demographic data

Factor	Total (n = 64)
Gender	
Male	48 (75.0%)
Female	16 (25.0%)
Age group (years)	
31-40	3 (4.7%)
41-50	16 (25.0%)
51-60	21 (32.8%)
>60	24 (37.5%)
Mean (range)	55 (33-99)
Site	
Right	32 (50.0%)
Left	30 (46.9%)
Both	2 (3.1%)
Symptoms	
Nasal obstruction	55 (85.9%)
Nasal mass	4 (6.2%)
Epistaxis	3 (4.7%)
Rhinorrhoea	1 (1.6%)
Nasal pain	1 (1.6%)
Krouse's staging	
I	4 (6.3%)
II	14 (21.9%)
III	45 (70.3%)
IV	1 (1.5%)

Table 3. Surgical approach according to Krouse's staging

Krouse's staging	Endoscopic approach	Combined approach	External approach
I	4 (100%)	0	0
II	10 (71.4%)	4 (28.6%)	0
III	25 (55.6%)	18 (40.0%)	2 (4.4%)
IV	0	1 (100%)	0
Total	39 (60.9%)	23 (35.9%)	2 (3.2%)

Table 4. Distribution of stages and recurrence

Krouse's staging	Recurrence
I	1 (25.0%)
II	2 (14.3%)
III	20 (44.4%)
IV	1 (100%)
Total	24 (37.5%)

Table 5. Recurrence rates according to Krouse's staging and surgical approaches

Krouse's staging	Endoscopic approach		Combined approach		External approach	
	Recurrence (-)	Recurrence (+)	Recurrence (-)	Recurrence (+)	Recurrence (-)	Recurrence (+)
I	3	1 (25.0%)	0	0	0	0
II	8	2 (20.0%)	4	0	0	0
III	11	14 (56.0%)	13	5 (27.8%)	1	1 (50.0%)
IV	0	0	0	1 (100%)	0	0
Total	22	17 (43.6%)	17	6 (26.1%)	1	1 (50.0%)

Table 6. Involved sites and recurrence rates

Site	No.*	Recurrence
Ostiomeatal unit (OMU)	40	15 (37.5%)
Ethmoid	39	19 (48.7%)
Medial wall of max	42	12 (28.6%)
Inferior wall of max	20	8 (40.0%)
Superior wall of max	16	7 (43.8%)
Lateral wall of max	14	6 (42.9%)
Sphenoid sinus	5	3 (60.0%)
Frontal sinus	17	14 (82.4%)

* Numbers are not mutually exclusive

There were minor complications in 14 patients (21.9%) synechea in nine patients (64.3%) and maxillary ostium stenosis in five patients (35.7%). No severe complications occurred.

Discussion

IPs are sinonasal tumors that typically present in the fifth and sixth decades of life and with male dominance[3]. The findings in our series are consistent with those data, as the male to female ratio was 3:1 and the average age was 55 years. The clinical presentation of IPs depends upon the sites of involvement, including unilateral nasal obstruction, nasal polyps, epistaxis, rhinorrhea, hyposmia, and frontal headache. However, the commonest symptom is progressive unilateral nasal obstruction[9]. The most common presenting symptom is unilateral nasal obstruction 85.9%, which is the same in other literature (58 to 98%)[3,10]. Examination usually detects unilateral masses with polypus appearance, more opaque and rugged than inflammatory polyps. However, inflammatory polyps can coexist with papillomas in 3.7 to 10%[11,12] of cases, and in the present study 3.1% had polyps coexisting with IPs. For this reason, sometimes on clinical examination, it was difficult to distinguish IPs from inflammatory polyps.

IP staging systems were first proposed in the 1966 based on the tumor size, lymph node, and metastasis status by Skolnick et al[13]. However, radiological extent and the location of IPs were considered more appropriate for classification into a staging system. Krouse presented a staging system for IPs based on endoscopic and computed tomography[5]. According to Krouse's classification, most patients were in stage III (70.3%) followed by stage II (21.9%), stage I (6.3%), and stage IV (1.5%). These findings were consistent with the results of other studies; especially in Korea, where most patients were in stage III (49.3%), followed by stage II (39.4%), stage I (6.9%), and stage IV (4.4%)[14].

The treatment of IPs aims to remove the disease completely and create post-operative anatomy that is easy for endoscopic surveillance[4,15]. Traditionally, open external approach methods, such as medial maxillectomy, were used. Nowadays, due to the disadvantage of the aesthetic consequences, greater morbidity, and the recent systematic analysis supporting the endoscopic approach[8], the use of external approach methods has decreased. Patients in stage I and II were treated using EEA. Three patients had disease recurrence, one patient was in stage I, two patients were in stage II, but no recurrence occurred when EEA was combined with the external approach group. In stage III, 20 patients had disease recurrence. The recurrence rate was lowest in the combined surgery group, 27.8%, followed by EEA 56%, and 100% in external approach. The one patient in stage IV (squamous cell carcinoma) with EEA combined with external approach also had disease recurrence. Previous studies reported a relationship between IP recurrence rate following Krouse's staging system that increased in the higher stages, as follows: stage I = 0%, stage II = 4%, stage III = 19.2%, and stage IV = 35.3%[16] but some studies found no association between the recurrence rate and Krouse's staging system, as follows: stage I = 19.0%, stage II =

13.8%, stage III = 16.9%, and stage IV = 16.7%[14]. No relationship between IP recurrence rate and Krouse's staging system was found in our series, but the recurrence rate of patients in stage II and III who had EEA combined with the external approach were lower than EEA alone (0% vs. 20% and 27.8% vs. 56%), which was consistent with Kim's study[17]. The authors believe that EEA had a limited approach for tumor of the anterolateral wall of the maxillary sinus or extended into the frontal sinus then combine with external approach or an osteoplastic flap maybe necessary[18]. The involved sites were categorized into eight groups, as mentioned above. The most common recurrence site was frontal sinus 82.4%, followed by sphenoid sinus 60%. These were consistent with Katori's study[19] due to the technical difficulties of undertaking complete resection in these anatomical areas.

The present study, 37.5% of the 64 patients had disease recurrence, which was similar to Supranee's study (37%)[20], the only previously published study in Thailand. The average time to recurrence was 7.5 months (range of 1 to 36 months). From other studies, the likelihood of local recurrence after resection varied. On the average, it ranged from 5 to 50%, depending on the extent of the disease and the resection method[21]. Most recurrence occurred at the site of the original tumor, suggesting incomplete local resection as the main cause of recurrence. Malignancy can either coexist with IPs at the time of diagnosis (i.e., synchronous) or develop later at the site of the previous resection (i.e., metachronous)[8]. The present study, 3.1% had malignant IPs (squamous cell carcinoma), one of them was diagnosed from the beginning as a malignant neoplasm and the other one became malignant 36 months after surgery, which was lower than in other literature that reported synchronous 7% and metachronous 3.6%[22].

In the present study, the authors agreed that EEA was an effective treatment for IP patients in Krouse's classification stage I and II. In stages III and IV, the surgeon's experience and lesion size ensure complete tumor resection. However, the surgeon should not hesitate to use combined approaches when EEA alone could not complete tumor resection in the difficult areas and long-term patient monitoring is needed to detect and treat tumor recurrence.

Conclusion

In Songklanagarind Hospital, the overall recurrence rate of IPs was 37.5%. EEA is an effective treatment for IPs, especially Krouse's classification stage I, II. The external approach combined with EEA could be useful when the tumor extends to the anterolateral wall of the maxillary sinus. Finally, the surgeon must pay particular attention to the frontal and sphenoid sinus because of the high local recurrence rate.

Limitation

In the present study, the surgical results came from multiple surgeons leading to the possibility of confounding factors.

What is already known on this topic?

IPs have a tendency to recur; EEA is an effective treatment for IPs.

What this study adds?

EEA combined with the external approach tends to be useful for decreasing the recurrence rate when the tumor extends into the difficult anatomical areas, especially the anterolateral wall of the maxillary sinus.

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Potential conflicts of interest

None.

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ผลการรักษาเนื้องอกชนิด อินเวอร์เต็ดแปปิวโลม่า ในโพรงจมูกและ/หรือโพรงอากาศข้างจมูกด้วยการผ่าตัด ในโรงพยาบาลสงขลานครินทร์

จักรพันธุ์ พรหมโสภา, สร้อยสุดา ธนหิรัญโรจน์

วัตถุประสงค์: เพื่อศึกษาผลการรักษาด้วยการผ่าตัดและอัตราการเป็นซ้ำของโรคก้อนเนื้องอกในจมูกชนิด อินเวอร์เต็ดแปปิวโลม่า ในโรงพยาบาลสงขลานครินทร์

วัสดุและวิธีการ: ได้ทำการรวบรวมเวชระเบียนของผู้ป่วยจำนวน 64 ราย ซึ่งได้รับการวินิจฉัยว่าเป็นเนื้องอกชนิด อินเวอร์เต็ดแปปิวโลม่า ในโพรงจมูก ที่เข้ารับการรักษาที่โรงพยาบาลสงขลานครินทร์ ตั้งแต่วันที่ 1 มกราคม พ.ศ. 2547 ถึง 30 ธันวาคม พ.ศ. 2555 โดยศึกษา เพศ อายุ อาการแสดง ระยะตาม Krouse's classification system วิธีการผ่าตัด ภาวะแทรกซ้อนจากการผ่าตัด และผลการรักษา

ผลการศึกษา: ผู้ป่วยทั้งหมด 64 ราย เป็นเพศชาย 48 ราย และเพศหญิง 16 ราย คิดเป็นอัตราส่วนเพศชายต่อเพศหญิง 3:1 โดยอยู่ในช่วงอายุระหว่าง 33-90 ปี มีค่าเฉลี่ย 55 ปี เมื่อแบ่งผู้ป่วยตาม Krouse's classification system พบมากที่สุดคือระยะที่ 3 จำนวน 45 ราย (70.3%) รองลงมาคือระยะที่ 2 จำนวน 14 ราย (21.9%) โดยผู้ป่วยทั้งหมดรักษาด้วยการผ่าตัดแบบส่องกล้องทางโพรงจมูกจำนวน 39 ราย (60.9%) รักษาด้วยการผ่าตัดโดยใช้การส่องกล้องร่วมกับการเปิดแผลด้านนอกจำนวน 25 ราย (35.9%) และเปิดแผลด้านนอกจำนวน 2 ราย (3.2%) ภาวะแทรกซ้อนจากการรักษาจำนวน 14 ราย (21.9%) ได้แก่ พังผืดในโพรงจมูกจำนวน 9 ราย (64.3%) และรูเปิดระบายโพรงไซนัสตีบแคบจำนวน 5 ราย (35.7%) เมื่อติดตามผู้ป่วยพบว่ามีการเกิดเป็นซ้ำของเนื้องอกจำนวน 24 ราย (37.5%) ส่วนใหญ่อยู่ในระยะ 3 และ 4 จำนวน 21 ราย (87.5%) และตำแหน่งที่พบการกลับเป็นซ้ำที่พบได้บ่อยคือ frontal และ sphenoid sinus โดยคิดเป็น 82.4% และ 60% ตามลำดับ

สรุป: การรักษาด้วยการผ่าตัดแบบส่องกล้องทางโพรงจมูกเป็นวิธีการผ่าตัดที่ได้ผลดีโดยเฉพาะในระยะ 1 และ 2 ตาม Krouse's classification system ส่วนในระยะ 3 และ 4 มีบางตำแหน่งที่เข้าถึงได้ยาก เช่น anterolateral wall ของ maxillary sinus จำต้องใช้การผ่าตัดส่องกล้องร่วมกับการเปิดแผลด้านนอก และในตำแหน่งที่ควรระมัดระวังในการผ่าตัดเนื่องจากพบการกลับเป็นซ้ำได้บ่อยคือ frontal และ sphenoid sinus