Recurrence rates according to surgical approaches for treating the sinonasal inverted papillomas

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The Master's Thesis
submitted to the Department of Medicine,
the Graduate School of Yonsei University
in partial fulfillment of the requirements for the degree
of Master of Medicine

Kim, Won Shik

November 2009

This certifies that the Master's Thesis
of Kim, Won Shik is approved.

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November 2009

ACKNOWLEDGEMENTS

이 논문이 완성되기까지 지대한 관심과 세심한 배려, 그리고 사랑과 격려를 베풀어 주신 윤주헌 교수님께 진심으로 감사 드립니다. 또한 논문의 작성과 심사에 많은 조언과 지도편달을 해주신 김창훈 교수님, 류대현 교수님께도 진심으로 감사 드립니다.

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2009년 11월
김원식 올림

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<ABSTRACT>

Recurrence rates according to surgical approaches for treating the sinonasal inverted papillomas

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Before the advent of the endoscopic era, most surgeons recommended medial maxillectomy via lateral rhinotomy in the treatment of advanced cases of inverted papilloma due to its tendency to recur following excision. However, permanent facial scarring is a major drawback of the lateral rhinotomy approach. In addition to the lateral rhinotomy approach, the midfacial degloving approach is a scarless alternative for managing advanced inverted papilloma. In the early 1990s, an endoscopic approach for the treatment of inverted papilloma was introduced and became the standard choice for surgical treatment. However, controversy still exists over which surgical approach should be used, the endoscopic method vs. the external method. In this study, we compared recurrence rates in patients treated with the endoscopic approach, midfacial degloving approach, and lateral rhinotomy approach by retrospective review of medical records of patients in each Krouse stage[1] of inverted papilloma. One hundred and fourteen patients (82 males, 32 females) with an average age of 51.0 years were diagnosed and treated surgically for inverted papilloma. The follow-up period ranged from 10 months to

12 years (mean, 2.8 years). The overall recurrence rate was 23.7% (27/114). The endoscopic approach was completed in 84 patients (73.7%), with a recurrence rate of 27.4%, while the medial maxillectomy with the midfacial degloving approach was used to treat 21 patients (18.4%), who had a recurrence rate of 9.5%. The medial maxillectomy with the lateral rhinotomy approach was completed in 9 patients (7.9%), with a recurrence rate of 22.2%. Eleven patients (9.6%) were classified as Krouse stage I, 50 patients (43.9%) as Krouse stage II, and 53 patients (46.5%) as Krouse stage III. None of the patients in this study were classified as Krouse stage IV. Among the patients classified with Krouse stage III, 27 patients were treated with the endoscopic approach and nine of these patients (33.3%) had recurrences. Eighteen patients were treated with the midfacial degloving approach and two of these patients (11.1%) had recurrences. Eight patients were treated with the lateral rhinotomy approach and two of these patients (25.0%) had recurrences. Among the patients classified with Krouse stage III, inverted papilloma had a lower risk of recurrence with midfacial degloving than with the endoscopic or lateral rhinotomy approaches, although this difference was not statistically significant ($p = 0.310$). Thus, for treating advanced inverted papilloma, the midfacial degloving approach is an alternative strategy with a fair recurrence rate, and is an approach that can replace the potentially scarring lateral rhinotomy approach.

Keywords : papilloma, inverted, midfacial degloving approach, recurrence rate

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I. INTRODUCTION

Inverted papilloma is a rare, locally aggressive neoplasm that arises in the Schneiderian epithelium of the nasal cavity and paranasal sinuses. The characteristic attributes of inverted papilloma are a tendency to recur following excision, a coexistence with nasal polyps, an ability to destroy surrounding structures, and an association with malignancy.[2] Because of these characteristics, before the advent of the endoscopic era, most surgeons recommended lateral rhinotomy with medial maxillectomy for the treatment of advanced cases of inverted papilloma. However, the lateral rhinotomy approach leaves permanent facial scars, which is one of the reasons why many surgeons consider it to be too invasive for the treatment of inverted papilloma. Besides the lateral rhinotomy

approach, the midfacial degloving approach is a relatively uncomplicated alternative option for managing inverted papilloma.[3-8] Furthermore, in the early 1990s, an endoscopic approach for the treatment of inverted papilloma was introduced to surgeons with resulting recurrence rates that were comparable or even superior to the conventional external approaches.[9-14] However, the controversy over the surgical approach of the endoscopic method vs. the external method still exists.

The aim of this study is to compare recurrence rates for the endoscopic approach, the midfacial degloving approach, and the lateral rhinotomy approach in patients diagnosed with each of the Krouse stages[1] of inverted papilloma, especially in advanced cases.

II. MATERIALS AND METHODS

Clinic, operative, radiologic, and pathologic records were reviewed retrospectively for patients diagnosed with inverted papilloma at the Severance Hospital, Yonsei University, College of Medicine from September 1987 through July 2008. Patients with less than 10 months of follow up and with associated malignancy were excluded. Only patients who had been treated with a pure endoscopic approach, the midfacial degloving approach, or the lateral rhinotomy approach were included, while patients who had been treated with a combined method were excluded. All the patients were classified by Krouse stage.

1. Statistical Analysis

Recurrence rates and intervals according to surgical approaches and recurrence rates in each Krouse stage were analyzed and compared using Fisher's exact tests and one way ANOVA using the SPSS 12 software package (SPSS Inc., Chicago, IL).

2. Demographic Findings

This study contains 114 patients who had been operated on for inverted papilloma. Eighty-two male patients and 32 female patients were diagnosed with inverted papilloma; the male to female ratio was 2.6:1. (Table 1) The follow-up period ranged from 10 months to 12 years, with a mean of 2.8 years.

Table 1. Age and Sex Distribution of Patients

Age	Male (%)	Female (%)	No. of cases (%)
-30	4	1	5 (4.4)
31-40	11	3	14 (12.3)
41-50	25	7	32 (28.1)
51-60	22	12	34 (29.8)
61-70	16	9	25 (21.9)
71-	4	0	4 (3.5)
Total	82 (71.9)	32 (28.1)	114 (100)

III. RESULTS

1. Preoperative Biopsy

Fifty-five patients (48.2%) were diagnosed with inverted papilloma preoperatively through intranasal punch biopsy. (Table 2) Forty-nine patients (43.0%) did not undergo a preoperative biopsy and were diagnosed with inverted papilloma postoperatively. An inflammatory polyp was noted in the preoperative biopsy for 5 patients (4.4%) and these patients were subsequently diagnosed with inverted papilloma after surgery. Of the remaining 5 patients, 3 (2.6%) were preoperatively diagnosed with Schneiderian papilloma, 1 (0.9%) with oncocytic papilloma, and 1 (0.9%) with fungiform papilloma. We found no significant difference in the recurrence rates between the patients with preoperatively proven inverted papilloma and the patients with no preoperative biopsy (23.6% vs. 24.5%).

Table 2. Preoperative Biopsy

Pathology	No. of cases (%)
Inverted papilloma	55 (48.2)
Oncocytic papilloma	1 (0.9)
Fungiform papilloma	1 (0.9)
Schneiderian papilloma	3 (2.6)
Inflammatory polyp	5 (4.4)
Not done	49 (43.0)
Total	114 (100)

2. Symptoms and Signs

The most frequent presenting symptom was nasal obstruction. The other symptoms or signs were nasal polyps, rhinorrhea, epistaxis, anosmia, headaches, and facial pressure. (Table 3)

Table 3. Symptoms and Signs

Symptoms & Signs	No. of cases (%)
Nasal obstruction	59 (51.8)
Nasal polyp	30 (26.3)
Rhinorrhea	14 (12.3)
Epistaxis	5 (4.4)
Anosmia	3 (2.6)
Headache	2 (1.8)
Facial pressure	1 (0.9)
Total	114 (100)

3. Extent of Tumor

Ninety-seven patients (85.1%) had involvement of the middle meatus, and lateral nasal wall involvement was found in 90 patients (78.9%). The anterior ethmoid sinus was involved in 57 patients (50.0%), the posterior ethmoid sinus was involved in 43 patients (37.7%), the maxillary sinus lateral wall was involved in 40 patients (35.1%), the sphenoid sinus was involved in 8 patients (7.0%), the frontal sinus was involved in 6 patients (5.3%) and the septum was involved in 2 patients (1.8%). (Table 4)

Table 4. Extent of tumor

Site	No. of cases (%)
Middle meatus	97 (85.1)
Lateral nasal wall	90 (78.9)
Maxillary sinus lateral wall	40 (35.1)
Anterior ethmoid sinus	57 (50.0)
Posterior ethmoid sinus	43 (37.7)
Sphenoid sinus	8 (7.0)
Frontal sinus	6 (5.3)
Septum	2 (1.8)

4. Recurrence Rates and Intervals between the Primary Operation and the First Recurrence According to Method of Treatment

The overall recurrence rate was 23.7% (27/114). Eighty-four patients (73.7%) were treated with the endoscopic approach, 21 patients (18.4%) with the midfacial degloving approach, and 9 patients (7.9%) with the lateral rhinotomy approach. Among the 84 patients with the endoscopic approach, recurrences were observed in 23 patients (27.4%) with a mean interval of 16.0 months. Of the 21 patients treated with the midfacial degloving approach, two patients (9.5%) had recurrences with a mean interval of 58.2 months. Two of nine patients (22.2%) treated with the lateral rhinotomy approach recurred with a mean interval of 92.0 months. We found no statistically significant difference between any of the surgical approach groups (p=0.287). The mean recurrence interval was longer with

the lateral rhinotomy approach than with the endoscopic approach (p=0.0083). However, we found no significant difference between the midfacial degloving approach and the endoscopic approach or between the midfacial degloving approach and the lateral rhinotomy approach. (Table 5)

Table 5. Recurrence Rates and Intervals According to Surgical Approaches

Surgical method	No. of cases (%)	No. of recurrences* (%)	Mean recurrence interval† in months
Endoscopic	84 (73.7)	23 (27.4)	16.0
Midfacial degloving	21 (18.4)	2 (9.5)	58.2
Lateral rhinotomy	9 (7.9)	2 (22.2)	92.0
Total	114 (100)	27 (23.7)	25.2

* p=0.287 by Fisher's Exact test, † p=0.010 by Kruskal-Wallis

5. Recurrence Rates by Krouse stage

Eleven patients (9.6%) were classified as Krouse stage I, 50 patients (43.9%) as Krouse stage II, and 53 patients (46.5%) as Krouse stage III. None of the patients among the group who had surgery with endoscopic, midfacial degloving, or the lateral rhinotomy approaches were classified as Krouse stage IV. The lack of stage IV patients in this study results from the exclusion of patients with associated malignancy, and even if such patients did not have malignancy,

the patients with extranasal involvement required additional or alternative approaches like osteoplastic or craniofacial resection and thus were subsequently excluded from this study. All of the 11 patients classified with Krouse stage I were treated with the endoscopic approach and 2 of them (9.6%) were found to have recurrences. The 46 patients with Krouse stage II were treated with the endoscopic approach and 12 of these patients (26.1%) were found to have recurrences. Three patients had surgery with midfacial degloving, while one patient was treated with the lateral rhinotomy approach. We found no recurrences in patients treated with the midfacial degloving approach or the lateral rhinotomy approach. Twenty-seven Krouse stage III patients were treated with an endoscopic approach and nine of them (33.3%) had recurrences. Eighteen patients were treated with the midfacial degloving approach and two of these patients (11.1%) had recurrences. Eight patients were treated with a lateral rhinotomy approach and two of them (25.0%) had recurrences. In Krouse stage III, inverted papilloma revealed a lower risk of recurrence with midfacial degloving than with endoscopic approach or lateral rhinotomy approach, although this was not statistically different ($p = 0.310$). (Table 6)

Table 6. Recurrence Rates by Krouse stage

	Krouse I No. of cases (%)	Krouse II No. of cases (%)	Krouse III * No. of cases (%)	Total No. of cases (%)
Endoscopic	2/11 (9.6)	12/46 (26.1)	9/27 (33.3)	23/84 (27.4)
Midfacial degloving	0 (0)	0/3 (0)	2/18 (11.1)	2/21 (9.5)
Lateral rhinotomy	0 (0)	0/1 (0)	2/8 (25.0)	2/9 (22.2)
Total	2/11 (9.6)	12/50 (24.0)	13/53 (24.5)	27/114 (23.7)

* P= 0.310 by Fisher's Exact test

IV. DISCUSSION

Inverted papilloma is known to develop more frequently in men than in women. The male preponderance of this study was 72% and this is in agreement with previous studies.[14, 15] The peak incidence in patients of this study during their fifth to seventh decades was in accordance with other previous studies.[14, 15]

Traditionally, inverted papilloma has been treated with the limited external approach, and the recurrence rate was reported to be as high as 78%.[16] To minimize the recurrence of inverted papilloma, wide exposure and en bloc resection had been performed by a medial maxillectomy via a lateral rhinotomy.

With the lateral rhinotomy approach, the recurrence rate was dramatically decreased, ranging between 15 and 16%.[8, 14] Despite this surprising improvement, lateral rhinotomy had the inherent disadvantage of facial scarring. Thus, the midfacial degloving approach was adopted as a scarless alternative in the treatment of inverted papilloma.[17, 18] With the midfacial degloving approach, the recurrence rate was reported to be as low as 2.1%.[8] In the early 1990s, the endoscopic approach was introduced, and the results of this approach with regards to recurrence rate were similar or even superior to the conventional external approaches.[9-14, 19] Nowadays, with the advanced techniques of endoscopic and optical instruments, the majority of patients with inverted papilloma are treated by the minimally invasive endoscopic approach. Moreover, widespread use of the endoscope in functional endoscopic sinus surgery makes many surgeons comfortable and familiar with the endoscopic surgical environment, which could be a factor favoring the endoscopic approach over the open approach, even in the advanced case of inverted papilloma. However, access to the maxillary sinus walls other than the medial wall is difficult with endoscopic approach alone. In those cases, the midfacial degloving approach provides good accessibility.

In this study, the midfacial degloving approach had lower recurrence rates than the endoscopic or lateral rhinotomy approaches, even though these differences were not statistically significant ($p=0.287$). A simple comparison of these results with other studies would be biased because each case has a different location and extent of the inverted papilloma, and each procedure is carried out by

surgeons with different levels of experience. This study is unique in that it presents a single institutional comparison between the recurrence rates of inverted papilloma depending on the Krouse stages in endoscopic, midfacial degloving, and lateral rhinotomy approaches. Patients with Krouse stage III inverted papilloma had a lower risk of recurrence with midfacial degloving than with the endoscopic approach or the lateral rhinotomy approach, although this difference was not statistically significant ($p = 0.310$). An explanation of the higher risk of recurrence in the endoscopic group might be the restricted handling of a poorly visualized and accessible region like the anterolateral surface of the maxillary sinus. Piecemeal resection is inevitable in the endoscopic management of advanced inverted papilloma, which occupy highly complicated structures like the nasal cavity and the paranasal sinuses. On the other hand, the midfacial degloving approach provides a wide surgical field, enabling en bloc resection of the lesion and showing a risk of recurrence that is comparable with the lateral rhinotomy in treating patients with Krouse stage III. (Table 6) According to this result, the midfacial degloving approach is an alternative option for the treatment of advanced inverted papilloma with a fair recurrence rate compared to the potentially scarring lateral rhinotomy approach.

The short follow-up period of this study decreases the reliability of the results because some studies have shown that many recurrences occurred after 2 years of follow-up.[20] This study was conducted using a retrospective method and could be biased due to the lack of randomization. However, a prospective study

that randomly allocates patients to each surgical approach group is not feasible on ethical grounds.

V. CONCLUSION

In the management of inverted papillomas, the appropriate surgical approach should be considered according to the extent of the tumor. For patients with Krouse stage I or II, the endoscopic approach is the treatment of choice. However, a more aggressive approach such as lateral rhinotomy or midfacial degloving approach should be chosen particularly in patients with Krouse stage III. In this study, patients with Krouse stage III advanced inverted papilloma had a lower risk of recurrence when treated with midfacial degloving approach than with the endoscopic approach or the lateral rhinotomy approach. We conclude that the midfacial degloving approach is an ideal surgical option for the treatment of advanced sinonasal inverted papilloma especially in Krouse stage III disease, and is a good alternative to the potentially scarring lateral rhinotomy approach.

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ABSTRACT(IN KOREAN)

비·부비동 반전성 유두종에서 수술 방법에 따른 재발률

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김 원 식

내시경적 접근법이 발달하기 이전에는 수술 후 재발을 잘 하는 비·부비동 반전성 유두종의 특성상 lateral rhinotomy 접근에 의한 medial maxillectomy가 수술적 치료의 근간이 되었다. 그러나 이 같은 접근법은 안면에 흉터를 남기는 단점이 있었으며, midfacial degloving 접근법과 같이 흉터가 남지 않는 방법이 대두되었다. 1990년대 초반 반전성 유두종의 치료에서 내시경적 접근법이 소개된 이후 현재에는 가장 널리 사용되는 치료법으로 자리잡았다. 그러나 각각의 접근법에 대해서는 아직까지 논쟁의 여지가 있다. 본 연구에서는 후향적 의무기록 조사를 통해 내시경적 접근법, lateral rhinotomy 접근법, midfacial degloving 접근법의 각 stage에 따른 재발률을 비교, 분석하였다. 총 114명의 환자(남자 82명, 여자 32명)가 치료 받았으며, 평균 연령은 51.0세이었다. 추적 관찰 기간은 8개월에서 12년까지이고, 평균 추적 관찰 기간은 2.9년이었다. 전체 재발율은 23.7% (27/114)이고, 내시경적 치료를 받은 환자군은 84명 (73.7%)으로 재발률은 27.4%이었다. Midfacial degloving approach로 치료를 받은 환자군은 21명 (18.4%)으로 재발률은 9.5%이었다. Lateral rhinotomy approach로 치료를

받은 환자군은 9명 (7.9%)으로 재발률은 22.2%이었다. Krouse stage I 인 환자는 11명 (9.6%), Krouse stage II 인 환자는 50명 (43.9%), Krouse stage III 인 환자는 53명 (46.5%) 이었다. Krouse stage III 인 환자군 중에서 23명이 내시경적 접근법으로 수술을 받았으며 이 중 9명 (33.3%)이 재발하였고, 18명은 midfacial degloving approach로 수술을 받았고 이 중 2명 (11.1%)이 재발하였으며, 8명은 lateral rhinotomy approach로 수술을 받아 이 중 2명 (25.0%)이 재발하였다. Krouse stage III 인 환자군에서 midfacial degloving approach로 수술을 받은 환자군에서 다른 접근법으로 수술을 받은 환자군보다 비록 통계학적으로 유의미하지는 않으나 재발률이 더 낮았다. Midfacial degloving approach는 advanced stage의 반전성 유두종 치료에 있어서 lateral rhinotomy appraoch와 비교해 볼 때 안면의 흉터를 남기지 않으면서도 재발률 면에서 큰 차이를 보이지 않는 수술적 접근법의 한 대안이 될 수 있을 것이다.

핵심되는 말 : 반전성 유두종, 얼굴중간노출술, 재발률

PUBLICATION LIST