Nasal Endoscope: An Armamentarium in the Management of Sinonasal Inverted Papilloma

Nagendra P. B. Kadapa · L. Sudarshan Reddy · Venkataram Reddy ·
P. Kumuda · M. Vishnu Vardhan Reddy · L. M. S. Chandra Sekhara Rao

Received: 17 February 2014 / Accepted: 15 March 2014 / Published online: 26 March 2014
© Association of Otolaryngologists of India 2014

Abstract Sinonasal inverted papillomas (SIP) are unique group of locally aggressive benign neoplastic lesions arising from mucosa of sinonasal tract with potential for recurrences and known association with squamous cell carcinoma in 5–15 % of cases. This study was conducted was to assess the efficacy and usefulness of the nasal endoscope in treating SIP. We reviewed 28 biopsy proven cases of SIPs that were treated at our hospital between June 2009 and September 2013. Average patient age was 46 years. Fourteen were treated by transnasal endoscopic excision of tumor with noted recurrence of 21.43 %. Thirteen were treated by endoscopic assisted open surgery which had 23 % recurrence. Three patients had malignant inverted papillomas, of whom two (7 %) were found to have synchronous squamous cell carcinoma and one (3.6 %) had metachronous squamous cell carcinoma. No evidence of recurrence was found in rest during our follow up. The endoscopic approach is the preferred method for the treatment of the majority of inverted papillomas. Powered instrumentation is extremely useful to achieve good results. Although significant number of cases was done by external approach by lateral rhinotomy, the endoscopic assistance is required to ensure complete removal of the tumour to reduce the recurrence rates. Close follow up of the patient for a longer period of time is

necessary for the early detection of recurrence and to allow for surgical salvage.

Keywords Sinonasal inverted papilloma · Exclusive transnasal endoscopic excision · Endoscopic assisted open surgery

Introduction

Inverted papilloma of the nasal cavity and paranasal sinuses is a benign epithelial tumor of unknown etiology, Sinonasal inverted papilloma (SIP) is one of the sub-types of Schneiderian papilloma. First described by Ward in 1854 [1], SIP represents 0.5–5 % of all sinonasal tumors.

Schneiderian Papillomas were named in honour of C. Victor Schneider, in the 1600s, demonstrated that nasal mucosa produces catarrh and not Cerebrospinal fluid and identified its origin from the ectoderm. The earliest description of the nasal papilloma was by Billroth in 1855 [2]. Later, it was differentiated into hard and soft papilloma by Hopmann in 1883 [3]. SIP has characteristic polypoidal, fleshy, granular, mulberry appearance, bleeds on touch. It must be distinguished from other papillomas and polyps of nose. The characteristic endophytic growth pattern and the term ‘inverting papilloma’ was coined by Ringertz in 1938 [4]. It has many synonyms e.g., ‘genuine papilloma of the nasal cavity’ [5, 6], ‘inverting papilloma’ [7], and ‘inverted papilloma’ [8, 9], epithelial papilloma, fungiform papilloma, transitional cell papilloma, squamous cell papilloma, papillary sinusitis, soft papilloma, cylindrical cell carcinoma, polyp with inverting metaplasia, Ewing’s papilloma and benign transitional cell growth. Vrabec suggested the term ‘inverted Schneiderian papilloma’ as these tumours originated from schneiderian membrane, which was derived from ectoderm of nasal placode [10].

N. P. B. Kadapa · V. Reddy · P. Kumuda ·
M. V. V. Reddy · L. M. S. C. S. Rao
Dept. of Surgical Oncology, Basavatarakam Indo-American
Cancer Hospital, Hyderabad, India

L. S. Reddy (✉)
Osmania Medical College, Govt. ENT Hospital, Koti,
Hyderabad 500095, India
e-mail: drlsudarshanreddy9@gmail.com;
aoiapstatebranch@gmail.com

SIP arises from the mucosa of the sinonasal tract, almost always unilaterally [11–13] with male-to-female ratio of 3:1 [9, 14–16] and the peak incidence around 50 years of age [15, 17]. Tendency to recur after removal and its association with malignancy [18, 19] characterizes this entity. This study aims to assess the efficacy and usefulness of the nasal endoscope in treating SIP.

Materials and Methods

This prospective study was done on biopsy proven cases of SIP in our tertiary care institute for ENT diseases, from June 2009 to May 2011. Minimum follow up period of 15 months with average follow up of 41 months.

28 cases of inverted papilloma were diagnosed in this period. Twenty-seven patients were included in the study and one was excluded because of extensive involvement of bilateral frontal lobes of brain. All the 27 cases were operated; of whom 14 were exclusively resected by transnasal endoscopic approach. Remaining 13 cases were resected by endoscopic assisted open approach (Table 1). Tumour involving nasal cavity, osteomeatal complex, medial and posterior wall of maxillary sinus, ethmoid sinuses and minimal extension into frontal sinus and sphenoid sinuses were exclusively managed by transnasal endoscopic approach. Tumors with extra sinonasal extension, involvement of anterolateral wall of maxilla, associated malignancy and recurrent cases were operated by endoscopic assisted open surgical approach (Figs. 1, 2).

Apart from assessing the efficacy and usefulness of the nasal endoscope in treating SIP, we also analysed the complications, recurrence and the incidence of associated malignancy in both the approaches.

Results

The age of the patients ranged from 26 to 75 years (mean, 46.07 years); there were 20 men (71.0 %) and eight women (29.0 %) ratio being 2.5:1. Majority of patients belong to fourth decade of life (32 %) followed by fifth decade (28.57 %) with mean age of 46.07 years. The most common symptom was unilateral nasal obstruction. Most

common site involved was middle meatus (Table 2). One patient had tumor extending to anterior cranial fossa exposing dura with associated orbital abscess and ptosis. This patient was found to have associated synchronous squamous cell carcinoma. The same patient had bilateral involvement of nasal cavity and ethmoid which was managed with radiotherapy.

One elderly patient was operated by Caldwell luc with endoscopic assistance because of the involvement of anterolateral wall of maxilla which was not amenable for. Patients were followed up for a mean duration of 41 months (range 15–55 months). Recurrence was found in three of fourteen patients (21.43 %) who underwent exclusive transnasal endoscopic excision of tumor. Out of thirteen patients who underwent endoscopic assisted open approach, three patients (23.07 %) had recurrence (Table 3).

On an average, tumor recurrence was noted after 15 months. Malignancy was found in three patients, two patients (7 %) were found to have synchronous squamous cell carcinoma, and one (3.6 %) had metachronous squamous cell carcinoma after two years. Two of these patients were sent for radiotherapy and one was found to have liver metastasis and died later. No evidence of recurrence was found in rest of patients till last follow up.

Discussion

Inverted papilloma is a rare tumour accounting for 0.5–5 % of all nasal and sinus neoplasms [11–13]. The peak incidence of Inverted Papilloma in our study was in fourth decade of life followed by fifth decade. This is in conformity with many reports that peak incidence of SIP is around the age of 50 years [15, 17]. Average age in our study was 46 years. In a collection of 522 patients from five different studies, the average age was 54.3 years at the time of treatment [10, 15, 20]. Though Inverted papilloma is rare below age of 20 years, cases have been found between 6 and 90 years of age [10, 13]. The youngest patient in our study was aged 26 years at time of presentation and the eldest was 75 years.

The majority of patients in our study were males. There were 20 males (71 %) and 8 females (29 %) with male to female ratio in our study was 2.5:1. Male predominance of 2–3 times has been consistently reported in many studies [9, 14–16, 21, 22].

In our study most common primary site of origin was lateral nasal wall in 89.28 %, middle meatus being involved in 67.86 % of cases, inferior turbinate in 10.17 % and inferior meatus in 7.14 % cases. Krouse in 2001 [23] reviewed and summarized the published experiences with SIP from 1967 to 1997. The primary sites of SIP origin were documented

Table 1 Procedure adopted

Procedure	No. of patients	%
Exclusive Transnasal Endoscopic resection	14	51.85
Endoscopic assisted open approach	13	48.15
a. Lateral rhinotomy	12	44.44
b. Sublabial - cald well luc	1	3.7

Fig. 1 Inverted papilloma right posterior fontanelle. **a** CECT coronal view: soft tissue density area seen in the *right middle meatus*, **b** Endoscopic view of tumour mass, **c** Polypoid, fleshy, mulberry appearance tumour, **d** Post operative CT Scan

Fig. 2 Inverted papilloma involving maxillary, ethmoid and sphenoid. **a** CECT coronal view: soft tissue density area seen in maxillary sinus, middle meatus, ethmoid and sphenoid, **b** Histopathology Slide (X 10) showing inversion of epithelium in Inverted papilloma, **c** Post operative CT scan, **d** Lateral rhinotomy scar

including the lateral nasal wall followed by maxillary sinus. In Vrabec's series [10] of 101 cases, 69 had the involvement of maxillary sinus, 41 had ethmoides, 27 had involvement of the frontal sinus. According to Phillips et.al in 1990 [24], 82 % of

inverted Schneiderian papillomas involve the nasal cavity and sinuses, 13 % involve the nasal cavity alone, and 5 % only involve the sinuses. High incidence of variation is due to different follow up periods and cohort sizes [25]. Two patients

Table 2 Structures involved

Area	No. of patient	%
Middle meatus	19	67.86
Maxillary sinus	18	64.29
Ethmoid	14	50
Sphenoethmoidal recess/sinus	9	32.14
Frontal recess/sinus	7	25
Inferior turbinate	3	10.71
Orbit	3	10.71
Inferior meatus	2	07.14
Septum	1	03.57
Cranial fossa	1	03.57
Pterygo palatine fossa	1	03.57

Table 3 Recurrence after exclusive transnasal endoscopic versus endoscopic assisted open surgery

Procedure	No. of patients	No. of recurrence	% of recurrence
Exclusive transnasal endoscopic resection	14	3	21.43
Endoscopic assisted open surgery	13	3	23.07

had synchronous carcinoma and one had metachronous carcinoma in the present study, as is mentioned by many other studies showing an association of 8 % for synchronous carcinoma and 3.5 % for metachronous carcinoma [26–28]. Reported incidence of synchronous malignancy is higher than that of metachronous malignancy [15, 20, 22, 29]. Malignancy was noted predominantly in men and increased with increasing age [21, 28, 30, 31].

Reported recurrence rate after exclusive endoscopic removal was 28–74 % [7, 9, 12, 32]. Krouse's [23] reviewed published data of 30 years on 1426 patients of Inverted Papilloma and found recurrence rate of 18 % after aggressive open surgery (lateral rhinotomy, midface degloving, maxillectomy) and the recurrence rates of 11.8 % after endoscopic surgery. Waitz and Wigand noted a recurrence rate of endoscopic excision similar to the classic open approach [33]. This has also been reaffirmed by Stankiewicz J et al. 1993 and McCary WS et al. 1994 [34, 35]. Juan P. Di'az Molina et al. [36] in their study reviewed 61 cases of SIP noted 14 % recurrence by endoscopic procedures 67 % who were treated by open approaches. 156 cases of SIP were studied in their study of Xiao-Ting et al., tumor recurrence rates for different surgical approach were: 9.09 % for endoscopic surgical group, 23.08 % for traditional surgical group, and 12.12 % for combined surgical group. Synchronous malignancy rates for different surgical approach are: 2.02 % for endoscopic surgical group, 11.54 % traditional surgical group, and

9.09 % for combined group [37]. Of Sixty-seven patients studied by Giotakis et al. [38] reported recurrence rate was 59 % when they used endonasal non-endoscopic approach, 12.5 % with an external incision, and 12.8 % with endoscopic techniques.

In the present study, with the mean duration of follow up of 41 months, recurrence after exclusive trans nasal endoscopic resection is 21.4 %. While 23.1 % had recurrences in Endoscopic assisted Open Surgery arm which is more or less similar to exclusive transnasal endoscopic resection is 21.4 %. This emphasizes the need of endoscopy in clearing the disease even in the open surgical approach. The advantage of using endoscopy is well established in the previous studies in the management of SIP [7, 9, 12, 23, 32–38].

In present study, average duration of recurrence following surgery was 27.5 months which is similar to that of Kraft et al. 2003 [39] showing most recurrences within first 2 years of surgery.

Endoscopic management is usually reserved for treating limited and easily accessible tumors, which are confined to the lateral nasal wall with minimal extension into the anterior ethmoids. But now with the advantage of powered instrumentation, angled telescopes, and advanced surgical training; improved the reach and access to the paranasal areas lead to resect more advanced lesions with precision. There is a selection bias to compare the results of transnasal endoscopic versus open management. The recurrence rates of endoscopic management of straightforward tumors were being compared with that of open management of more extensive and complex tumors. For the same reason, we tried analysing the results of Exclusive Transnasal Endoscopic resection vs Endoscopic assisted Open Surgery.

Although majority of cases are done by external approach by lateral rhinotomy (48.15 %), endoscopic assistance is required to ensure complete removal of tumour to achieve recurrence rates below 23 %. In half of the cases, when the tumour is confined to middle meatus, maxillary sinus, ethmoid, frontal recess and sphenoid sinus exclusive transnasal endoscopic approach was used. Powered instrumentation is extremely useful to achieve good results. When complete resection is not possible, or for tumors with associated malignancy, radiotherapy is recommended as an adjunct to surgery [37, 38].

Average duration of follow up was 41 months. Diagnostic Nasal Endoscopy was done to look for any signs of recurrence and all suspicious lesions were biopsied.

Conclusion

In Sinonasal Inverted Papilloma, whether or not associated with squamous cell carcinoma, complete surgical removal

of the tumor is advocated as the treatment of choice. Endoscopic resection is preferred, whereas for lesions less accessible endoscopically, or in those with peripheral extension, open surgery is indicated. Endoscopic assistance is required to ensure complete removal of tumour to reduce recurrence rates in open surgery. Powered instrumentation is extremely useful to achieve good results. Timely post operative follow up with diagnostic nasal endoscopy and biopsy of suspected lesions is important for early detection of recurrences and malignancy transformation.

References

- Ward N (1854) A mirror of the practice of medicine and surgery in the hospitals of London: London hospital. *Lancet* 2:480–482
- Billroth T (1855) Ueber den Bau der Schleimpolyphen. Georg Reimer, Berlin
- Hopmann CM (1883) Die papillaren Geschwulste der Nasenschleimhaut. *Virchows Arch Pathol Anat* 93:213–258
- Ringertz N (1938) Pathology of malignant tumors arising in nasal and paranasal cavities and maxilla. *Acta Otolaryngol* 27:31–42
- Kramer R, Som ML (1935) True papilloma of the nasal cavity. *Arch Otolaryngol* 22:22–43
- Som PM, Lawson W, Lidov MW (1991) Simulated aggressive skull base erosion in response to benign sinonasal disease. *Radiology* 180(3):755–759
- Norris HJ (1963) Papillary lesions of the nasal cavity and paranasal sinuses. *Laryngoscope* 73:1–17
- Fechner RE, Alford DO (1968) Inverted papilloma and squamous carcinoma; an unusual case. *Arch Otolaryngol* 88:507–512
- Hyams VJ (1971) Papillomas of the nasal cavity and paranasal sinuses. *Ann Otol Rhinol Laryngol* 80:192–206
- Vrabec DP (1994) The inverted Schneiderian papilloma: a 25-year study. *Laryngoscope* 104:582–605
- Lantis SH, Stool S, Koblenzer PJ (1968) Papillomas of the nasal cavity: report of a case. *Arch Dermatol* 98:636–639
- Batsakis JG (1987) Pathology of lesions of the nose and paranasal sinuses: clinical and pathologic considerations. In: Goldm JL (ed) *The Principles and Practice of Rhinology*. John Wiley and Sons, New York, pp 45–51
- Maranm AGD, Lund VJ (1990) Tumors of the Nose and Sinuses. In: Maran AGD, Lund VJ (eds) *Clinical Rhinology*. Thieme, Stuttgart, pp 140–177
- Nielsen PL, Buchwald C, Nielsen LH, Tos M (1991) Inverted papilloma of the nasal cavity: pathological aspects in a follow-up study. *Laryngoscope* 101:1094–1101
- Dolgin SR, Zaveri VD, Casiano RR, Maniglia AJ (1992) Different options for treatment of inverting papilloma of the nose and paranasal sinuses: a report of 41 cases. *Laryngoscope* 102:231–236
- Peter B, Grossenbacher R (1997) Invertierte Papillome der Nase und deren Nebenhöhlen. *Laryngorhinootologie* 76:14–18
- Ridolfi RL, Leiberman PH, Erlandson RA et al (1977) Schneiderian papillomas: a clinico-pathologic study of 30 cases. *Am J Surg Pathol* 1:43–45
- Barnes L (2002) Schneiderian papillomas and nonsalivary glandular neoplasms of the head and neck. *Mod Pathol* 15:279–297
- Eggers G, Muhling J, Hassfeld S (2007) Inverted papilloma of paranasal sinuses. *J Craniomaxillofac Surg* 35:21–29
- Weissler MC, Montgomery WW, Turner PA, Montgomery SK, Joseph MP (1986) Inverted papilloma. *Ann Otol Rhinol Laryngol* 95:215–221
- Buchwald C, Franzmann MB, Tos M (1995) Sinonasal papillomas: a report of 82 cases in Copenhagen county, including a longitudinal epidemiological study. *Laryngoscope* 105:72–79
- Lawson W, Ho BT, Shaari CM, Biller H (1995) Inverted papilloma: a report of 112 cases. *Laryngoscope* 105:282–288
- Krouse JH (2001) Endoscopic treatment of inverted papilloma: safety and efficacy. *Am J Otolaryngol* 22:87–99
- Phillips PP, Gustafson RO, Facer GW (1990) The clinical behavior of inverting papilloma of the nose and paranasal sinuses: report of 112 cases and review of the literature. *Laryngoscope* 100:463–469
- Arndt O, Nottelmann K, Brock J, Neumann OG (1994) Das invertierte Papillom und seine Assoziation mit dem humane Papillomvirus (HPV). *HNO* 42:670–676
- Set Bielamowicz, Calcaterra TC, Watson D (1993) Inverting papilloma of the head and neck: the UCLA update. *Otolaryngol Head Neck Surg* 109:71–76
- Lawson W, Le Benger J, Som P, Bernard PJ, Biller HF (1989) Inverted papilloma: an analysis of 87 cases. *Laryngoscope* 99:1117–1124
- Lesperance MM, Esclamado RM (1995) Squamous cell carcinoma arising in inverted papilloma. *Laryngoscope* 105:178–183
- Myers EN, Fernau JL, Johnson JT, Tabet JC, Barnes L (1990) Management of inverted papilloma. *Laryngoscope* 100:481–490
- Christensen WN, Smith RRL (1986) Schneiderian papillomas: a clinicopathologic study of 67 cases. *Hum Pathol* 17:393–400
- Myers EN, Schramm VL, Barnes EL (1981) Management of inverted papilloma of the nose and paranasal sinuses. *Laryngoscope* 91:2071–2084
- Ganzer U, Donath K, Schmelzle R (1992) Geschwulste der inneren Nase, der Nasennebenhöhlen, des Ober- und Unterkiefers. In: Naumann HH, Helms J, Herberhold C, Kastenbauer E (eds) *Oto-Rhino-Laryngologie in Klinik und Praxis*, vol 2. Thieme, Stuttgart, pp 312–359
- Waitz G, Wigand ME (1992) Results of endoscopic sinus surgery for the treatment of inverted papillomas. *Laryngoscope* 102:917–921
- Stankiewicz JA, Girgis SJ (1993) Endoscopic surgical treatment of nasal and paranasal sinus Inverted Papilloma. *Otolaryngol Head Neck Surg* 109:985–988
- McCary W, Gross CW, Reibel JF, Cantrell RW (1994) Preliminary report: endoscopic versus external surgery in the management of inverting papilloma. *Laryngoscope* 104:415–419
- Juan P. Dr'az Molina, Jose' L. Llorente Pendas, Juan P. Rodrigo Tapia, Cesar Alvarez Marcos (2009) Sergio Obeso Agüera y Carlos Sua'rez Nieto Inverted sinonasal papillomas. Review of 61 cases. *Acta Otorrinolaringol Esp*. 60(6):402–408
- Xiao-Ting W, Peng L, Xiu-Qing W, Hai-Bo W, Wen-Hui P, Bing L, Er-Peng Z, Guang-Gang S (2013) Factors affecting recurrence of sinonasal inverted papilloma. *Eur Arch Otorhinolaryngol* 270(4):1349–1353. doi:10.1007/s00405-012-2216-z
- Giotakis E, Eleftheriadou A, Ferekidou E, Kandiloros D, Manolopoulos L, Yiotakis I (2010) Clinical outcomes of sinonasal inverted papilloma surgery. A retrospective study of 67 cases. *B-ENT* 6(2):111–116
- Kraft M, Simmen D, Kaufmann T, Holzmann D (2003) Long-term results of endonasal sinus surgery in sinonasal papillomas. *Laryngoscope* 113:1541–1547