Int J Clin Exp Pathol 2016;9(5):5760-5765
www.ijcep.com /ISSN:1936-2625/IJCEP0022399

Case Report

Endoscopic resection combined with radiotherapy of posterior nasoseptal chondrosarcoma: a case report and literature review

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Received December 21, 2015; Accepted March 20, 2016; Epub May 1, 2016; Published May 15, 2016

Abstract: Chondrosarcomas originating from the posteriornasal septum are rare. Surgical resection is the recommended treatment modality. Although remarkable advancements in endoscopic surgery and operation navigational system have allowed for the successful treatment of various sinonasal neoplasms, few sinonasal chondrosarcomas have been resected using an endoscopic approach sincethe first report of endoscopic excisiona decade ago. As well, seldom cases have been treated by a combination of endoscopic surgery with radiotherapy. Here we present a case of a posterior nasoseptal chondrosarcoma that extended to the bilateral ethmoid and sphenoid sinuses. Histopathological and immunohistochemical analysis confirmed grade II chondrosarcoma. After being treated by endoscopic surgery and radiotherapy, the patient showed no evidence of recurrence for five years. This present case highlights the endoscopic approach as a promising option for early stage chondrosarcomas which could lead to long-term cancer-free survival. In addition, the latest advances of radiotherapy are also reviewed.

Keywords: Chondrosarcoma, nasal septum, endoscope, radiotherapy

Introduction

Chondrosarcomas of the head and neck are rare malignant neoplasms and comprise only 0.1% of all head and neck cancers [1]. The predominantly site of origin for chondrosarcomas of the head and neck is the laryngeal cartilage [2]. Chondrosarcomas originating from the posterior nasoseptum are extremely rare. Due to the slow-growing nature of this tumor, early symptoms are non-specific and variable, such as nasal blockage, nasal discharge, epistaxis, headache and anosmia. The lesion gradually involves and destroys the adjacent structures, including the paranasal sinuses, skull base, palate, and orbit walls. Due to the difficulty identifying early stage posterior nasoseptal chondrosarcomas, the chance of minimally invasive endoscopic excision is comparatively less [3]. Recently, a review of sinonasal chondrosarcomas indicated that radiotherapy in conjunction with external or endoscopic surgical resection may be beneficial and help to prolong time of recurrence. However, this conclusion was based off of 29 cases total including only two using an endoscopic approach. Currently, without oncological multicenter studies of sinonasal chondrosarcomas, clinical consensus regarding endoscopic surgery and radiotherapy cannot be reached. Here, we present a new case of posterior nasoseptal chondrosarcoma that was successfully treated with endoscopic surgery and postoperative radiotherapy.

Case report

A 31-year-old male patient presented with an 8-month history of gradually progressively bilateral nasal blockage and headache. He deniedepistaxis, ear fullness, visual disturbance or facial numbness. There was no palpable cervical lymphnodes. Nasal endoscopy revealed a firm, smooth-surfaced, hypochromicmass occupying both nasal cavities. A biopsy was performed and the histopathologic features sug-

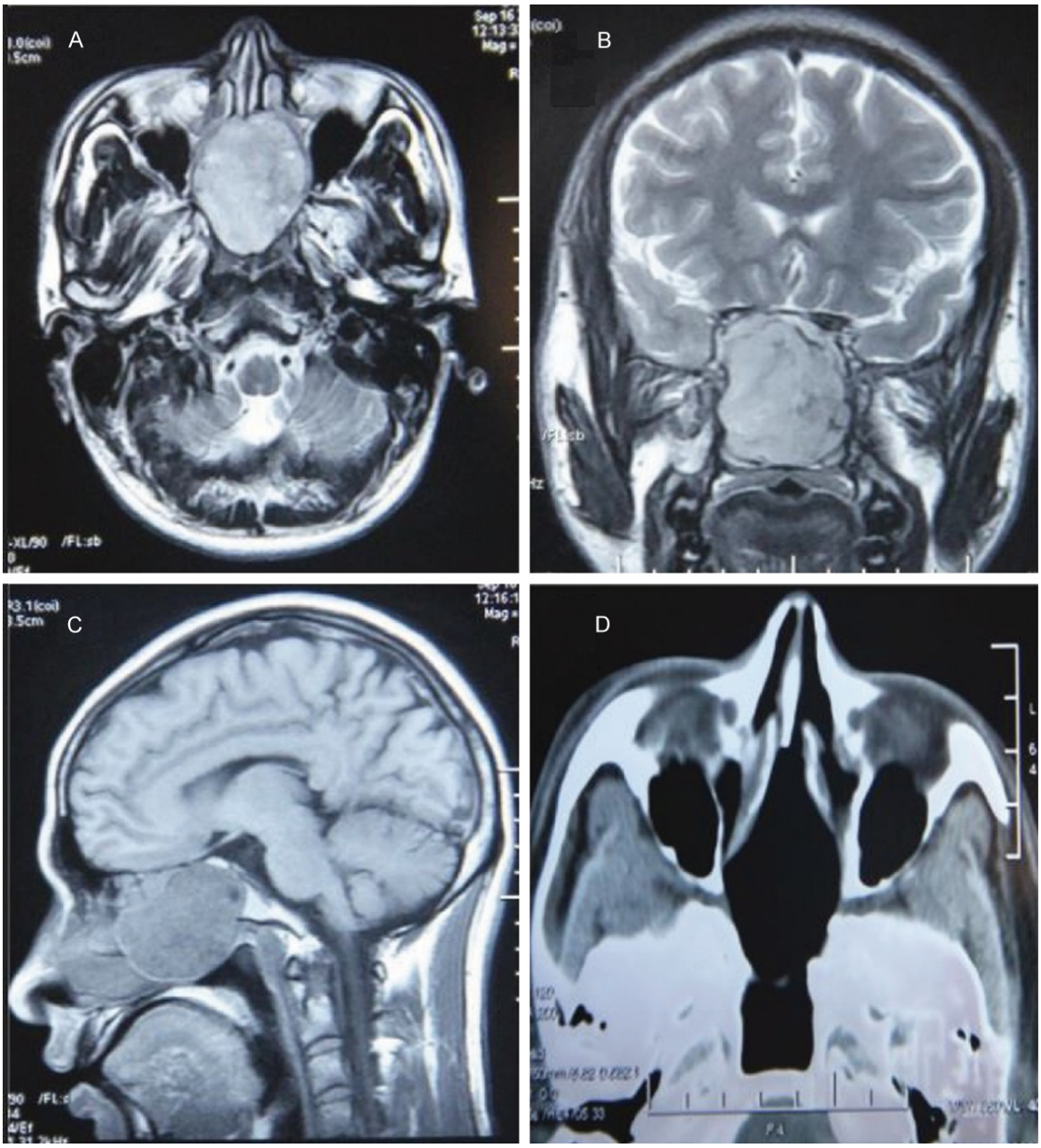

Figure 1. A. Axial T2-weighted MRI showed a well circumscribed solid neoplasm originating from posterior nasoseptal with hyper-intense T2 signal. B. Coronal T2-weighted MRI showed the tumor filled almost all sphenoid sinus space, abutting bilateral cavernous sinus. C. T1-weighted sagittal MRI showed the tumor with hypo-intense signal extended posteriorly and reached the clivus and sellaturcica. The cranial base and hard palate were not invaded. D. CT scan showed the clearance of the tumor one year after the whole therapeutic process.

gested grade II chondrosarcoma. CT scan revealed a large low-density mass with punctate calcificationin the medial posterior nasal septum and causing erosion bilaterally in the ethmoid and sphenoid sinus. MRI showed a well circum scribed solid neoplasm with hypointense on T1-weighted images, and hyperintense on T2-weighted images (**Figure 1A-C**). The lesion extended posteriorly intothe sphenoid sinus, abutting the middle fossa and clivus. The skull base, orbital walls and hard palate were spared.

A nasalendoscopic surgery was conducted and the tumor was excised together with the posterior nasal septum and bilateral ethmoidal and

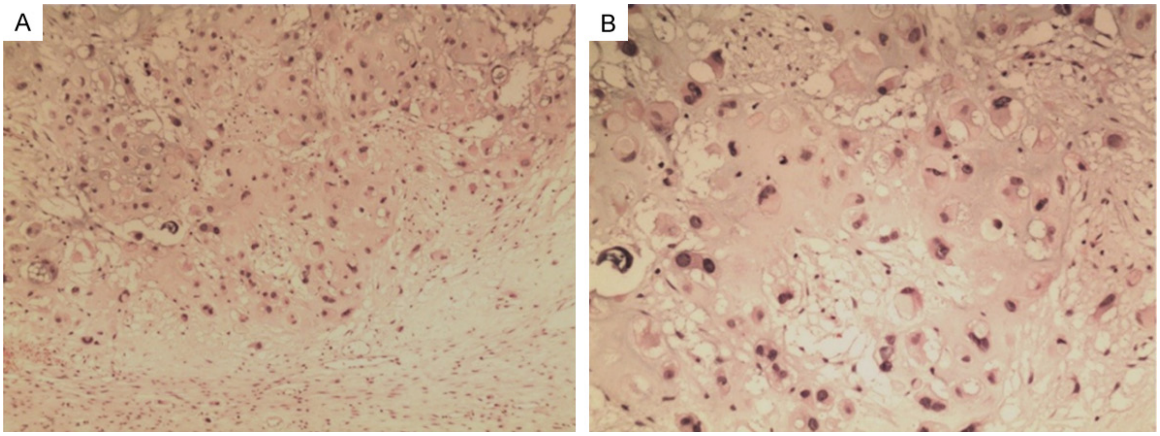

Figure 2. A. Low magnification showed chondroid stroma, multicellular lacunae and groups of mildly atypical chondrocytes. B. High magnification showed chondrocyte pleomorphism with enlarged and binucleated cells containing small, hyperchromatic nuclei. Mitotic activity is not well displayed, no spindling is seen. The features are suggestive of grade II chondrosarcoma (H&E, original magnification: A × 40, B × 200).

sphenoid sinuses. No evidence of orbital or intra-cranial involvement was identified. The bone of sellaturcica was thin but remained intact, thus no margin was removed inferior to the sellaturcica. Margins on the edge of the cribriform plate, orbit walls, septum and palatum durum were harvested. Intraoperative frozen section revealed negative margins.

Histopathologic diagnosis of the resected specimens revealed a grade II chondrosarcoma (**Figure 2A**, **2B**). Immunohistochemical analysis showed positive expression of S-100, NSE and vimentin (**Figure 3A-C**). Positive expression of Ki-67 showed less than 5% of cellular activity (**Figure 3D**). Radiotherapy was suggested by oncological consultancy one month after the patient was discharged from the otorhinolaryngology department. Intensity-modulated radiation regimen was designed as 32 Gy of clinical tumor volume delivered (2 Gy per fraction) while sparing neighboring critical structures. CT scan confirmed the clearance of the tumor after completion of radiotherapy (**Figure 1D**). Regular nasal endoscope and radiographic examination were arranged postope ratively on an annual basis, and the patient has no evidence of recurrence for 5 years.

Discussion

Chondrosarcoma is a slow growing but malignant tumor. When the tumor roots in a site such as theposterior nasal septum, it is hard to diagnosein the early stages. Primary early nasoseptal chondrosarcomas usually present with various non-specific symptoms or without any complaints and are found incidentally [5]. The most common symptoms are nasal obstruction [6]. In the case of continuous nasal obstruction that is unresponsive to medical management, chondrosarcomas should be considered in the differential diagnosis in order to initiate treatment in the early stage.

Radiographic imaging is essential to characterize the density and extent of the tumor. Chondrosarcomas typically appear as a hypodense matrix with scattered small calcifications and bone erosionon CT scan [7]. High-resolution MRI is used to accurately define the tumor extent and correlates well with surgical findings [6]. The lesion often appears hypointense on T1-weighted images, and hyperintense on T2-weighted images with heterogeneous enhancement after injection of gadolinium. The differential diagnosis in radiographic imaging includes other tumors that arise from the nasal septum, such as the chondroma, aggressive osteblastoma, squamous cell carcinoma, adenocarcinoma, melanoma, and others [8]. Chondromas may be the most difficult one to distinguish from low-grade chondrosarcomas, which are tend not to erode bone. The recommended primary treatment of chondromas and chondrosarcomas in the nasal septum is surgical excision.

Histologically, chondrosarcomas are classified into 3 types: (1) primary chondrosarcomas,

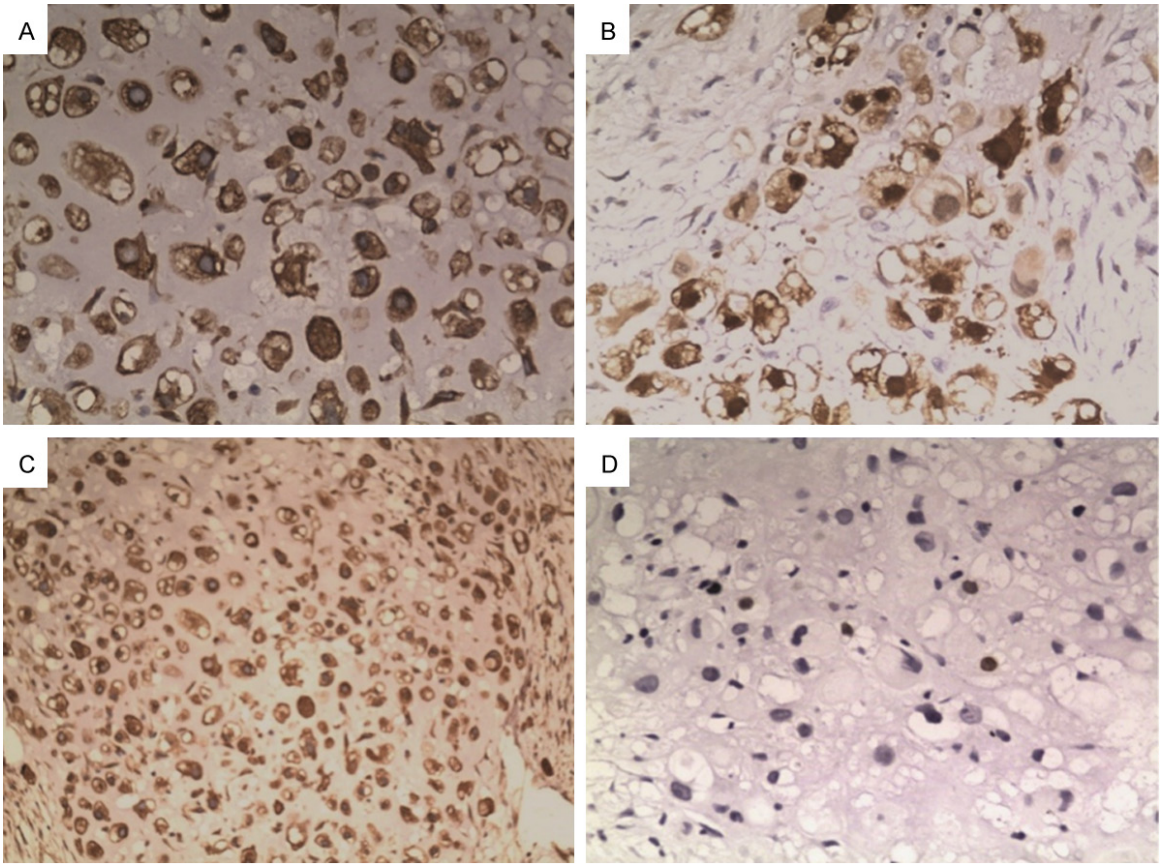

Figure 3. Immunohistochemical expressions were positive for S-100 (A), NSE (B), and vimentin (C). Positive expression of ki-67 showed less than 5% of cellular activity (D).

arising from undifferentiated perichondrial cells, (2) secondary chondrosarcomas, arising from altered cells either in a central chondromas or cartilaginous exostosis, and (3) mesenchymal chondrosarcomas, arising from primitive mesenchymal cells [7]. Chondrosarcomas may be misdiagnosed as chondromas, chondroblastic osteosarcoma, and chondroidchordomas. Various immunohistochemical staining markers including vimentin, S-100 and NSE can beapplicated to differentiate chondrosarcomas from other chondroitic tumors. Chondrosarcomas express vimentin and S-100 but generally do not stain with epithelial markers such as keratin or EMA whereas chondromas are lack of vimentin immunoreactivity [9]. Ki-67 immunostaining allows an easy and rapid evaluation of tumor samples and reliable for determining cell proliferation. Primary bone chondrosarcoma showed a low mean Ki-67 labeling index value (3.7±0.8) [10]. Histological and immunostaining analysis provide promising methods to distinguish the subtypes of chondrosarcomas. Tissue Microarray (TMA) technology can be used to examine and reproduce the morphological and immunohistochemical results [11], in order to make a definitive diagnosis in combination with clinic characteristics and radiographic findings.

Surgical resection is recommended as the primary treatment for nasoseptal chondrosarcomas. Various surgical approaches, such as radical antrectomy through a Weber-Ferguson incision, sublabial transnasal approach, lateral rhinotomy approach, and craniofacial approach with modified Weber-Ferguson incisions have been adopted to deal with chondrosarcomas of head and neck [12]. It should be highlighted that the sole purpose of surgery is to achieve histologically clear margins, which is correlative with recurrence rates [13, 14]. Encouraged by the development of endoscopic techniques and surgical navigation system, the minimally invasive endoscopic approach is advocated for removing multiple neoplasms [15]. The endo-

nasal endoscopic surgery providesless impairment to patients, fewer postsurgical complications and better quality of life than external surgery. Endoscopic surgery can be used to excise skull base tumors such as clivalchordomas and chondrosarcomas [16]. The first report of a nasoseptal chondrosarcoma resected via an intranasal approach with endoscopic surgical techniques was in 2002 [17]. However, recent systematic review indicated that the open surgical approach is still primarily used clinically and only 10 cases out of a total of 161 sinonasal chondrosarcomas were treated by endoscopic surgery [4].

Besides the initial surgery, adjuvant radiotherapyis considered to have some role in the entire oncotherapy of chondrosarcomas of head and neck. Most chondrosarcomas are resistant to radiation and chemotherapy. A novel study revealed that dual gene silencing technology could be used to enhance radiosensitivity of grade II chondrosarcomas [18]. Furthermore, the study also showed a synergistic effect of dual gene silencing on apoptosis of tumor cells [18]. One reports demonstrated that laryngeal chondrosarcomas were treated by sole radiotherapy [19]. A systematic review of the sinonasal chondrosarcoma from 1950 to 2012 indicated that radiotherapy helped to prolong time of recurrence. However there was lack of detailed evidence about tumor staging and severity of disease. As well, only 2 cases were treated by a combination of endoscopic surgery and radiotherapy [4]. Recently advantages of proton and carbon ion radiation in the treatment of chondrosarcoma were reported by some oncological institutes [20]. High local control rates of proton and carbon ion radiation are outstanding by precise and rapid delivery of high radiation doses. Meanwhile a relatively low toxicity is confirmed since the radiation doseis rapidly demolished where is out of the targeted region [21].

In conclusion, surgical resection with negative margins should be emphasized while radiotherapy can be used in an adjuvant role in the treatment of nasoseptal chondrosarcomas. Endoscopic surgical techniques provide a reliable chance for minimally invasive resection of sinonasal tumors. Combined with radiotherapy, it is more likely to benefit to the patients of nasoseptal chondrosarcomas.

Acknowledgements

This work is supported by the scholarship from China Scholarship Council (CSC).

Disclosure of conflict of interest

None.

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