The Journal of Laryngology & Otology
July 2001, Vol. **115,** pp. 580–584

Inflammatory pseudotumour involving the skull base and cervical spine

Yang-Sun Cho, M.D., Sung-Min Kim, M.D., Won Ho Chung, M.D., Sung Hwa Hong, M.D.

Abstract
Inflammatory pseudotumour (IPT) is an idiopathic condition characterized by sclerosing inflammation, which mimics a neoplastic process. IPT involving the skull base and cervical spine is distinctly rare and usually indistinguishable from aggressive neoplasms or infection. We report a case of IPT involving the skull base and cervical spine. Initially the patient complained of headache and hearing loss without other neurological dysfunction. Two cycles of oral systemic steroid therapy resulted in only partial responses. Low dose radiotherapy was followed by quadriparesis as the lesion infiltrated into the cervical vertebral bodies. Subsequently a second course of radiation was administered to the whole cervical spine. Marked improvement was observed clinically and radiologically; however, the patient gradually deteriorated and died of sepsis. Given the aggressive nature of disease and the complications related to the long-term treatment, we suggest that a more aggressive therapeutic approach is suitable in extensive IPT of the skull base.

Key words: Granuloma, Plasma Cell; Skull Base; Vertebrae, Cervical

Introduction

Inflammatory pseudotumour (IPT) appearing in the head and neck is an idiopathic inflammatory disease that most frequently arises in the orbit but may also be found in the larynx,[1] the paranasal sinus,[2] the parapharynx,[3] the infratemporal fossa[4] and the cervical spine.[5] The disease is rarely found in the skull base. An IPT involving the skull base can be extremely aggressive, resulting in bone destruction and cranial nerve palsy, which makes it difficult to differentiate the condition from other malignant or infectious diseases using only clinical and radiological methods.[6,7] It is mandatory that a biopsy is performed to make the diagnosis of IPT. Histologically, IPT demonstrates a chronic infiltration of inflammatory cells such as plasma cells, lymphocytes or eosinophils and various degrees of fibrosis.[8] However, IPT remains a diagnosis of exclusion because there is no pathognomonic finding histologically. A definite diagnosis is especially difficult in cases involving the skull base where anatomical considerations make it hard to obtain appropriate tissue.

We present a case of IPT affecting a large area including the skull base and the cervical spine. This pattern of spread has not been reported previously in IPT. These features were identified by serial magnetic resonance imaging (MRI). The disease was not affected by steroid treatment but demonstrated a brief and partial response to low dose radiotherapy. After a second course of radiotherapy, there was improvement clinically and radiologically.

Case report

A 62-year-old male presented with hearing difficulties in the right ear and occasional pain in the right temporal bone and the temporomandibular joint (TMJ) areas for

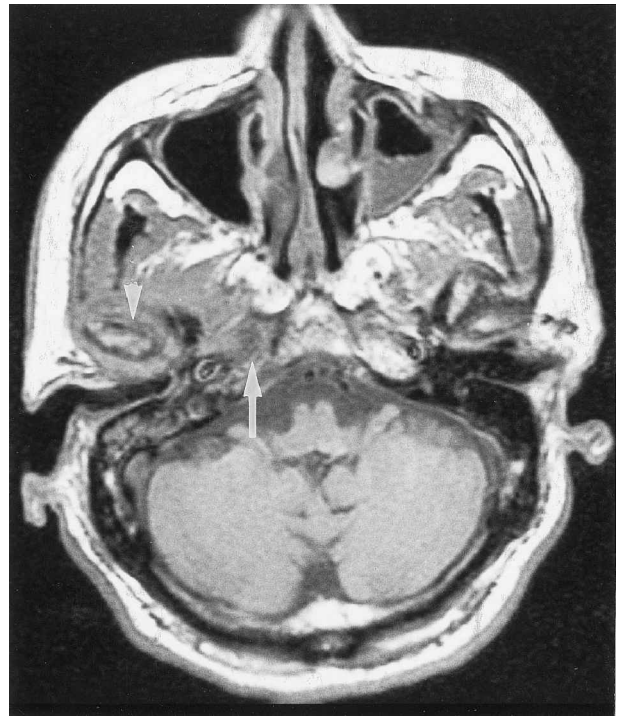

Fig. 1a

T1-weighted axial MRI at the level of mid-skull base. The image shows an isodense infiltrative lesion in the right temporomandibular joint area (arrowhead) and petrous apex (arrow). An effusion is demonstrated in the right mastoid air cell system.

From the Department of Otorhinolaryngology–Head and Neck Surgery, Sungkyunkwan University School of Medicine, Samsung Medical Center, Seoul, Korea
Accepted for publication: 25 January 2001.

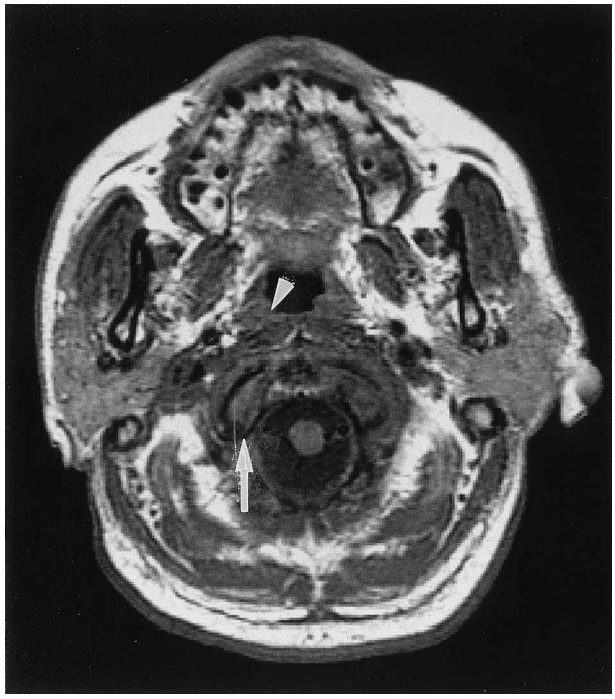

FIG. 1b

The image shows a diffuse thickening of the nasopharyngeal wall (arrowhead) and loss of fatty marrow in the occipital bone at both sides (arrow).

seven months. Audiometry revealed conductive hearing loss of the right ear. The right tympanic membrane was amber-coloured and there was diffuse swelling in the right nasopharynx. The patient was afebrile and no abnormalities were apparent upon neurological examination. A blood test revealed fasting blood sugar level elevated at 178 mg/dL and the erythrocyte sedimentation rate was raised at 45 mm/hr.

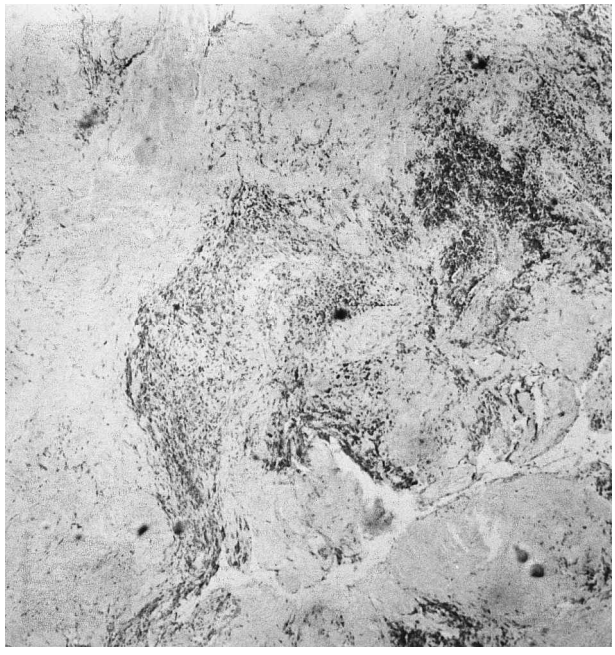

FIG. 2

Nasopharyngeal biopsy showing mixed lymphocytic-fibrotic lesion. There is dense lymphoid cell infiltration with diffuse stromal fibrosis (H & E; × 40)

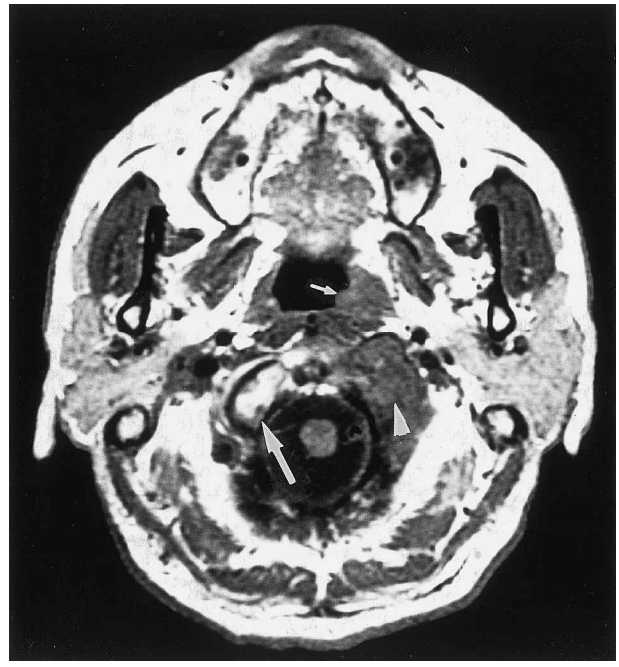

FIG. 3

T1-weighted axial MRI after two cycles of high dose steroid therapy. The image shows an enlargement of left nasopharynx (small arrow). The infiltrative lesion enlarged at the left side of the occipital bone (arrowhead), whereas the right side shows recovery of normal fatty marrow (arrow).

A T1-weighted MRI of the skull base showed a mass almost isodense to the brain parenchyme around the right TMJ and the posterior wall of the nasopharynx. The mass had invaded the normal bone marrow of the right petrous apex and the occipital bone crossing the midline (Figure 1a, b). The lesion showed diffuse enhancement with gadolinium and was of low signal intensity on the T2-weighted images.

A biopsy was taken in the right nasopharynx by a transoral approach. A firm pale-yellow mass was observed in the prevertebral space and the results of the biopsy indicated a chronic non-specific inflammation and fibrosis (Figure 2). Under the diagnosis of IPT, the patient was treated with 60 mg prednisolone per day for 10 days and tapered over the following four days. The pain was relieved and hearing in the right ear improved subjectively with disappearance of effusion during the treatment. However, the pain returned soon after completion of the treatment and hearing in the right ear deteriorated again. Additional treatment with 60 mg prednisolone daily was continued for 28 days and the dosage was tapered off over the following 10 days. Over the course of the treatment, the patient reported pain alleviation and improved hearing as before. However, the pain returned to the left preauricular area after the completion of treatment and the patient complained of decreased hearing in the left ear. An MRI taken at that time indicated that a portion of the right occipital bone showed recovery of normal fatty marrow but the lesion had newly expanded into the left nasopharynx and the first cervical vertebral body (Figure 3). The left tympanic membrane was amber-coloured and the posterior wall of the left nasopharynx was elevated without mucosal changes.

Another biopsy performed in the deep portion of the left nasopharynx showed no malignant cells, consistent with previous biopsy results. A total of 2000 cGy radiation was applied, divided over 10 applications on the field including the right TMJ, nasopharynx, and the first and the

https://doi.org/10.1258/0022215011908298 Published online by Cambridge University Press

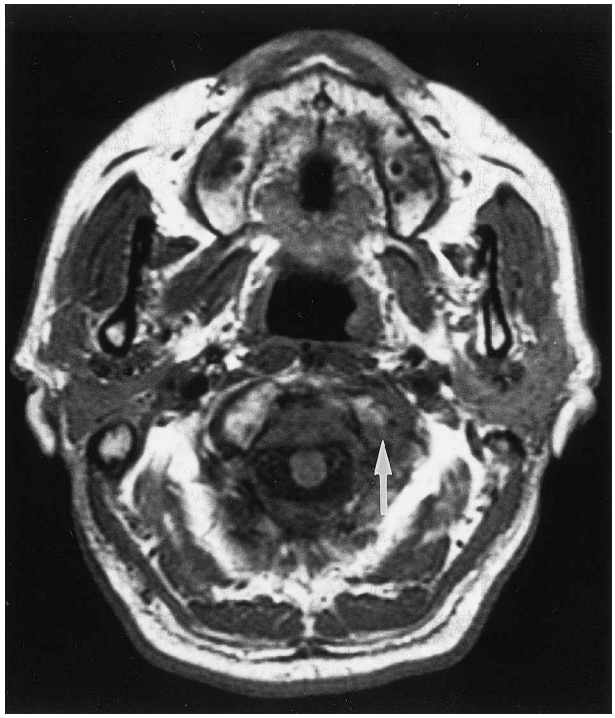

FIG. 4

T1-weighted axial MRI after 2000 cGy radiotherapy. Infiltrative lesions of the occipital bone and the posterior wall of the nasopharynx have almost disappeared. The left side of the occipital bone shows high signal intensity suggesting recovery of normal fatty marrow (arrow).

second cervical vertebral body. Following radiotherapy, the pain almost disappeared and elevations in the nasopharynx were not visible. A follow-up MRI showed almost complete elimination of the lesion with evidence of recovery to normal fatty marrow (Figure 4).

Four months after radiotherapy, the patient was admitted to the emergency room with quadriparesis and dysuria. An MRI of the cervical spine showed an ill-defined lesion compressing the spinal cord at the first to fourth cervical vertebral bodies (Figure 5). To rule out a malignant tumour, a biopsy was again taken of the second cervical vertebral body by the transoral approach. The result of the biopsy was largely consistent with the previous biopsy results of chronic non-specific inflammation with further progression of fibrosis. The results of culture tests of fungus and bacteria were all negative. The result of a PCR study for IgH and TCR-γ, to exclude lymphoma, was also negative. A total of 3000 cGy radiation was given from the first to seventh cervical vertebrae, divided into 15 applications. After the second radiotherapy, the lesion disappeared (Figure 6) and motor function recovered almost to normal. However, dysphagia and general weakness developed, which were suspected to be caused by delayed healing of the biopsy wound and the pharyngitis resulting from the radiotherapy and subsequent malnutrition. The patient suffered from fever and confusion, and eventually died of sepsis from a urinary tract infection one month after completion of radiotherapy.

Discussion

Clinically, an IPT involving the skull base causes symptoms such as cranial nerve palsies, pain or hypopituitarism as the mass grows and compresses surrounding tissues.[7,9,10] However, the disease may present malignant features

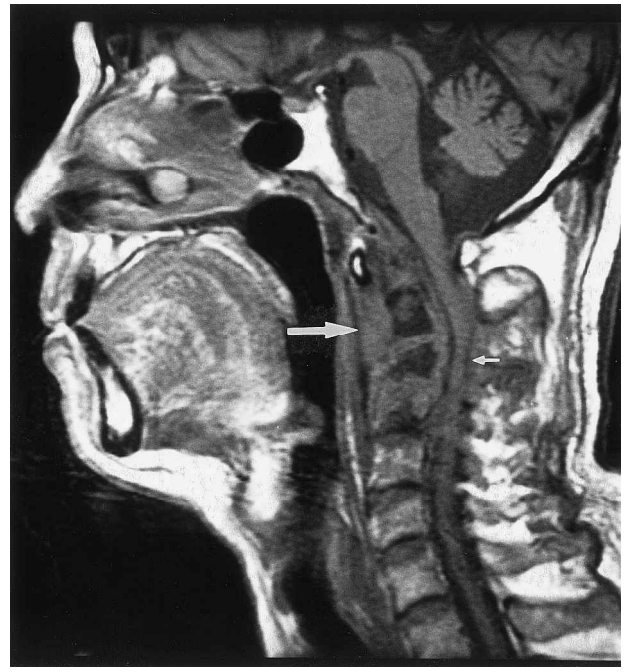

FIG. 5

T1-weighted sagittal MRI. There is an infiltrative lesions in the upper cervical spine from C1 to C4 (arrow). Spinal cord compression by the mass is also noted (small arrow).

such as relapse and infiltrating surrounding tissues,[6,11–13] as occurred in the present case.

IPT has no distinctive characteristics either clinically or radiologically. Hence, a diagnosis of pseudotumour can be made only after other specific disorders are completely eliminated.[6,9] In this case, we conducted the second biopsy because the lesion progressed even after two sessions of steroid therapy. We attempted to rule out other disorders

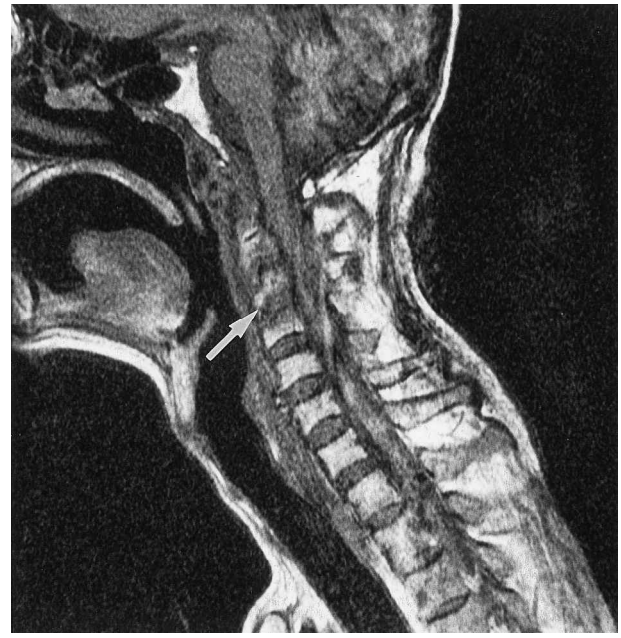

FIG. 6

T1-weighted sagittal MRI after 3000 cGy radiotherapy on the cervical spine. The diffuse infiltrative lesion involving vertebral bodies has markedly decreased. The cervical vertebral bodies show high signal intensity suggesting recovery of normal fatty marrow (arrow)

https://doi.org/10.1258/0022215011908298 Published online by Cambridge University Press

by another biopsy after the cervical vertebrae were invaded and the quadriparesis developed. Histologically, IPT can be classified into three subtypes, diffuse lymphocytic, mixed lymphocytic-fibrotic, and predominantly fibrotic features.[14] The findings of all three biopsies could be classified as mixed lymphocytic-fibrotic type, although the last biopsy showed more advanced fibrotic features, which could be explained as an effect of the radiation.

The cause and natural course of IPT have not been identified. The role of chronic infection as the aetiology of IPT remains speculative. Although it has been proposed that IPT of the lung is the consequence of disordered resolution of pneumonitis,[15] we could not find any evidence of infection histologically or in the results of culture study.

Specific treatment modalities of IPT have yet to be defined. Current treatments include systemic steroid therapy, radiotherapy, surgery, or a combination of these depending on the location of the mass, the degree of invasion into surrounding tissues and the possibility of complete resection.

For treatment at the initial stage, a high-dose steroid therapy is frequently used. In some cases, the steroid therapy can be expected to bring remarkable recovery, both clinically and radiologically.[16] The response to steroid therapy is known to be related to histological classification: the higher the chronic fibrosis, the less effective the response to steroid therapy.[17] Significant differences exist among reports on the dosage and the duration of steroid therapy: some reports recommend a daily dosage of 60 mg prednisolone for 10–14 days and a gradual decrease,[1,16] while others recommend a long-term course of up to six months at 80 mg/day.[18] However, steroid therapy carries a low rate of complete remission, ranging from 37 to 50 per cent, and frequent relapse.[16,19] To prevent relapse, a long-term low-dose maintenance therapy is recommended.[18,20] Although it is difficult to determine the precise effects of systematic steroid therapy on IPT involving the skull base, it has been known to stabilize or alleviate pain and cranial nerve dysfunction, and to stop the growth of the mass radiologically.[7,10] Because IPT is histologically benign and has never been reported to metastasize,[4] this form of therapy is widely applied as an initial therapy.

Radiotherapy can be used in cases where the steroid therapy produces no response, where there is relapse soon after the treatment, or where a high dose of steroid is contraindicated. Sergott *et al.*[21] and Kim *et al.*[22] have reported achieving complete remission without relapse in 70–100 per cent of patients who underwent low-dose radiotherapy.

Surgical removal may be considered where complete resection is possible without damaging important structures. Although there have been reports of successful treatment of IPT involving the skull base with surgical ablation,[6] a radical resection can be considered only in cases where the anatomical complexity and post-operative functional and cosmetic defects have been taken into account.

In the presenting case, a high dose of steroid therapy was administered twice during the initial stages of treatment. The symptoms improved temporarily with steroid therapy, but radiological findings showed no major changes or progression of the lesion. Given the aggressive nature of this lesion, the duration of initial steroid therapy is now believed to have been too short. Steroids seem to have had only a temporarily suppressive role in the process. The radiotherapy would have been better after the first relapse rather than repeated steroid therapy. However, considering the quadriparesis that resulted from relapse in the mid-cervical vertebrae, which were not included in the radiation field, the potential for radiologically hidden disease should be addressed when the radiation field is determined. Given that the patient died of complications related to the long-term treatment despite the major improvements of the lesion, we suggest that the cases of extensive IPT of the skull base should be treated with aggressive initial therapy.

Acknowledgements

We thank Dong Gyu Na, M.D. for his help in preparing and analysing images, Young-Hyeh Ko, M.D. for her valuable assistance in analysing pathological findings.

References

1 Sclafani AP, Kimmelman CP, McCormick SA. Inflammatory pseudotumor of the larynx: comparison with orbital inflammatory pseudotumor with clinical implications. *Otolaryngol Head Neck Surg* 1993;**109**:548–51

2 Hardley J, Coady AT, Milford CA. Pseudotumor of the maxillary antrum. *J Laryngol Otol* 1990;**104**:244–7

3 De Vuysere S, Hermans R, Sciot R, Crevits I, Marchal G. Extraorbital inflammatory pseudotumor of the head and neck: CT and MR findings in three patients. *Am J Neuroradiol* 1992;**20**:1133–9

4 Patel PC, Pellitteri PK, Vrabec DP, Szymanski M. Tumefactive fibroinflammatory lesion of the head and neck originating in the infratemporal fossa. *Am J Otolaryngol* 1998;**19**:216–9

5 Sze G, Brant-Zawadzki MN, Wilson CR, Norman D, Newton TH. Pseudotumor of the craniovertebral junction associated with chronic subluxation: MR imaging studies. *Radiology* 1986;**161**:391–4

6 Chen JM, Moll C, Schotton J, Fisch U. Inflammatory pseudotumors of the skull base. *Skull Base Surg* 1994;**4**:93–8

9 Gartman JJ, Powers SK, Fortune M. Pseudotumor of the sellar and parasellar areas. *Neurosurgery* 1989;**24**:896–901

10 Olmos PR, Falko JM, Rea GL, Boesel CP, Chakeres DW, McGhee DB. Fibrosing pseudotumor of the sellar and parasellar area producing hypopituitarism and multiple cranial nerve palsies. *Neurosurgery* 1993;**32**:1015–21

11 Frohman LP, Kupersmith MJ, Lang J, Reede D, Bergeron RT, Aleksic S, *et al.* Intracranial extension and bone destruction in orbital pseudotumor. *Arch Ophthalmol* 1986;**104**:380–4

12 Keen M, Conley J, McBride T, Mutter G, Silver J. Pseudotumor of the pterygomaxillary space presenting as anesthesia of the mandibular nerve. *Laryngoscope* 1986;**96**:560–3

13 Weisman RA, Osguthorpe JD. Pseudotumor of the head and neck masquerading as neoplasia. *Laryngoscope* 1988;**98**:610–4

14 Henderson JW, Farrow GM. *Orbital Tumours,* 2nd Edn. New York: BC Decker, 1984

15 Matsubara O, Tan-Liu NS, Kenney RM, Mark EJ. Inflammatory pseudotumor of the lung: progression from organizing pneumonia to fibrosis histiocytoma or to plasma cell granuloma in 32 cases. *Hum Pathol* 1988;**19**:807–14

16 Mombaerts I, Schlingemann RO, Goldschmeding R, Koornneef L. Are systemic corticosteroids useful in the management of orbital pseudotumors? *Ophthalmology* 1996;**103**:521–7

17 Heersink B, Ridrigues MR, Flanagan JC. Inflammatory pseudotumor of the orbit. *Ann Ophthalmol* 1977;**9**:17–29

18 Laurenzo JF, Graham SM. Tumefactive fibroinflammatory lesion of the head and neck: a managment strategy. *Ear Nose Throat J* 1995;**74**:87–94

19 Leone C, Lloyd W. Treatment protocol for orbital inflammatory disease. *Ophthalmology* 1985;**92**:1325–31

20 Oslen KD, DeSanto LW, Word LE, Weiland LH. Tumefactive fibroinflammatory lesions of the head and neck. *Laryngoscope* 1986;**96**:940–4

21 Sergot RC, Glaser JS, Charyulu K. Radiotherapy for idiopathic inflammatory orbital pseudotumor. *Arch Ophthalmol* 1981;**99**:853–6

22 Kim RY, Roth RE. Radiotherapy of orbital pseudotumor. *Radiology* 1978;**127**:507–9

Address for correspondence:
Sung Hwa Hong,
Department of Otorhinolaryngology-Head and Neck Surgery,
Sungkyunkwan University School of Medicine,
Samsung Medical Center,
50 Ilwon-dong, Kangnam-ku,
Seoul, 135–710, Korea.

Fax: (02) 3410-3879
E-mail: shhong@smc.samsung.co.kr

Dr Y-S. Cho takes responsibility for the integrity of the content of the paper.
Competing interests: None declared