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Grisel's Syndrome in an Adult After Endoscopic Nasopharyngectomy

Andy J. K. Chua, MBBS, MMed (ORL); Bernard W. S. Tan, MBBS, MRCS (Ed); Tiong Yong Tan, MBBS, FRCR; Harold H. W. Heah, MBBS, MMed (ORL)

Background: Grisel's syndrome is rare in adults, and is characterized by nontraumatic atlanto-axial subluxation secondary to infection. Here, we report a case of Grisel's syndrome occurring after endoscopic nasopharyngectomy.

Methods: A 67-year-old man complained of fever and neck pain with reduced lateral rotation after an endoscopic nasopharyngectomy for recurrent nasopharyngeal carcinoma. Flexion and extension X-rays of the cervical spine demonstrated atlanto-axial subluxation, and magnetic resonance imaging showed infective changes with cervical osteomyelitis. A diagnosis of Grisel's syndrome with cervical spine osteomyelitis was made. A later computed tomography (CT) scan demonstrated subluxation of C1 on C2, as well as the occipital-C1 joint.

Results: The patient was treated with intravenous antibiotics and offered surgery for spinal stabilization, but declined. He remained well 15 months post-op on a cervical collar with minimal pain and no neurologic deficits.

Conclusion: A high index of suspicion for Grisel's syndrome is suggested in patients who have neck pain with reduced range of motion postnasopharyngectomy, and imaging is useful in clinching the diagnosis.

Key Words: Nasopharyngeal carcinoma, nasopharyngectomy, Grisel's syndrome, atlanto-axial subluxation, cervical osteomyelitis.

Level of Evidence: 4

INTRODUCTION

Grisel's syndrome is a rare condition that is characterized by nontraumatic atlanto-axial subluxation, secondary to a head and neck infection. It is most commonly reported in children as a complication of adenoidectomy. Here, we report a case of Grisel's syndrome in an adult following endoscopic nasopharyngectomy for recurrent nasopharyngeal carcinoma (NPC).

CASE REPORT

A 67-year-old Chinese man on surveillance for previously treated T1N0M0 WHO type III NPC was found to have a mass lesion in the left Fossa of Rosenmüller (FOR). He was 20 years postradiotherapy and was otherwise asymptomatic. A punch biopsy of the lesion was performed, which showed recurrent undifferentiated non-keratinizing NPC. Staging scans revealed that the lesion was confined purely to the mucosal surface of the nasopharynx with no nodal or distant metastases. Other than postradiation hypopituitarism for which he was taking oral levothyroxine and hydrocortisone, he had no other medical problems and had an excellent functional status with full independence in all activities. In particular, his neck was supple with a full range of motion. The case was discussed at our institution's multidisciplinary tumor board and salvage surgery was recommended; the patient consented to proceeding with salvage nasopharyngectomy.

Perioperative intravenous amoxicillin-clavulanate was given for surgical prophylaxis. An endoscopic nasopharyngectomy was performed using the technique described by Castelnuovo et al,[1] with intraoperative frozen section control of margins. The resection was performed using a combination of monopolar cautery and a Coblator II device with settings at coblate 7 and coagulate 3. The resection borders extended cranio-caudally from the roof of the postnasal space to the level of the soft palate, and laterally from the right FOR to a point anterior to the left Eustachian cushion. The depth of resection was down to the level of the prevertebral fascia. All margins returned negative for malignancy. A right-sided vascularized nasoseptal flap based on the posterior septal branch of sphenopalatine artery was laid over the surgical bed for reconstruction. The final histology was negative for carcinoma.

Postoperatively, he developed vague, generalized neck pain and stiffness and reduced lateral rotation which progressively worsened. On the fifth postoperative day, he developed fever with a temperature of 38.3°C, accompanied by torticollis and a complete inability to turn the head. There were no neurological deficits. Flexion views of the cervical spine on X-ray demonstrated increased widening between the anterior arch of C1 and the odontoid dens on flexion views (Fig. 1). This was followed up with a magnetic resonance imaging (MRI) scan of the cervical spine, which

From the Department of Otolaryngology (A.J.K.C., B.W.S.T., H.H.W.H.), Singapore General Hospital, Singapore, Singapore; Department of Radiology (T.Y.T.), Changi General Hospital, Singapore, Singapore

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Send correspondence to Andy J. K. Chua, Department of Otolaryngology, Singapore General Hospital, Outram Road, Singapore 169608, Singapore. E-mail: andychua.jk@gmail.com

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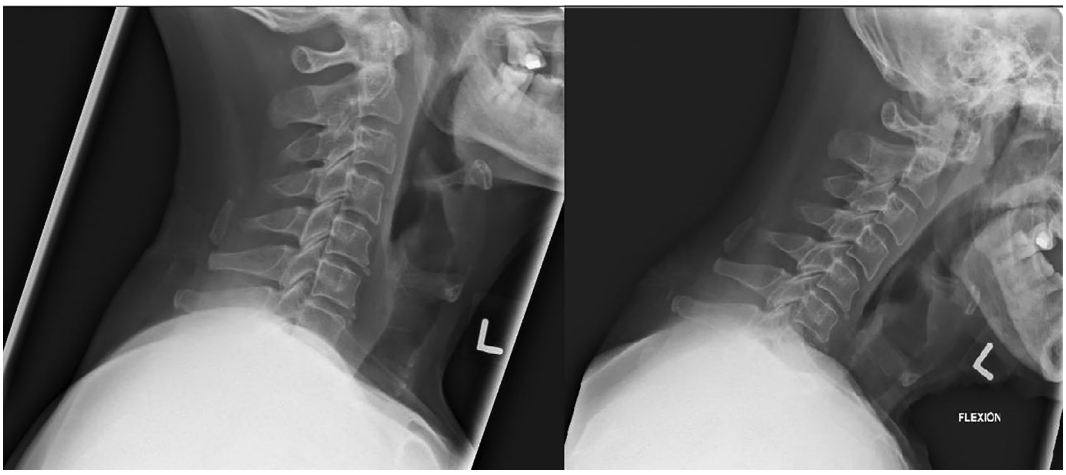

Fig. 1. Radiograph of the patient's cervical spine, lateral flexion view, showing increased distance of 6 mm between the anterior arch of C1 vertebra and the dens, suggestive of atlanto-axial instability.

showed extensive bone marrow edema along the anterior arch of C1 and nearly the entire body of C2, with focal thinning of the transverse and apical ligaments. There was also a suggestion of bony cortical erosions along the anterior and posterior aspects of the odontoid peg (Fig. 2a, 2b). These radiological changes were not present on the preoperative MRI scan. Rotatory views were not possible due to pain, and motion artifacts precluded clear visualization of the occipital-C1 and C1-C2 junctions on coronal views; however, based on the physical examination findings and radiological features of ligamentous laxity, the clinical diagnosis of Grisel's syndrome with cervical spine osteomyelitis was made. Blood cultures showed *Morganella morganii* bacteremia. An Orthopedic spine consult was sought, and he was placed on an Aspen collar, with a view for possible stabilization surgery once the infection had resolved. He received 8 weeks of culture-directed intravenous antibiotics, followed by another 4 weeks of oral antibiotics. Throughout this time, the nasoseptal flap was viable and had taken well, with no exposure of the underlying muscle or bone to the nasopharyngeal cavity. His thyroid hormone replacement was adequate.

After completion of the antibiotic regime, the patient reported an improvement in his neck pain, but had intermittent right upper limb numbness over the C6 to C8 dermatomes. Hoffman's sign was negative bilaterally, but he did demonstrate generalized hyperreflexia. A repeat MRI of the cervical spine was obtained, which demonstrated persistent enhancing inflammatory fluid in the atlanto-dental space, extending to the level of C4. There remained extensive marrow edema of C1 and C2 with an associated pathological fracture of the odontoid peg, which was compressing on the anterior surface of the cervical cord with severe spinal canal stenosis and localized cord edema (Fig. 2c). In view of the findings, the patient was again offered spinal decompression and stabilization. However, he declined surgery due to the

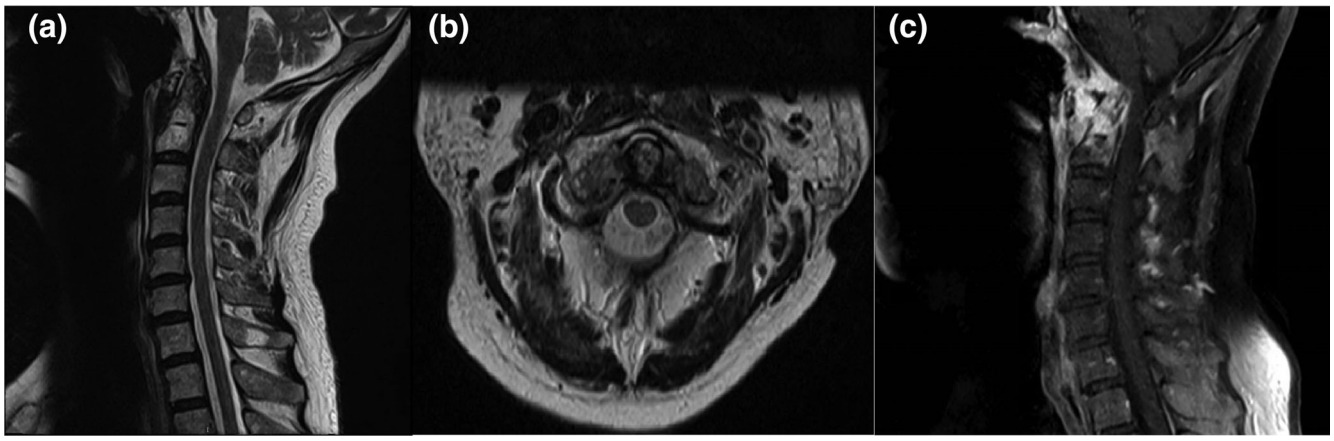

Fig. 2. (a) Magnetic resonance imaging (MRI) of the cervical spine, showing extensive bone marrow edema along the anterior arch of C1 and nearly the entire body of C2, with focal thinning of the transverse and apical ligaments, (b) Possible bony cortical erosions seen along the anterior and posterior aspects of the odontoid peg, and (c) Sagittal MRI of the cervical spine demonstrating enhancing inflammatory fluid in the atlanto-dental space, extending to the level of C4. There remained extensive marrow edema of C1 and C2 with an associated pathological fracture of the odontoid peg.

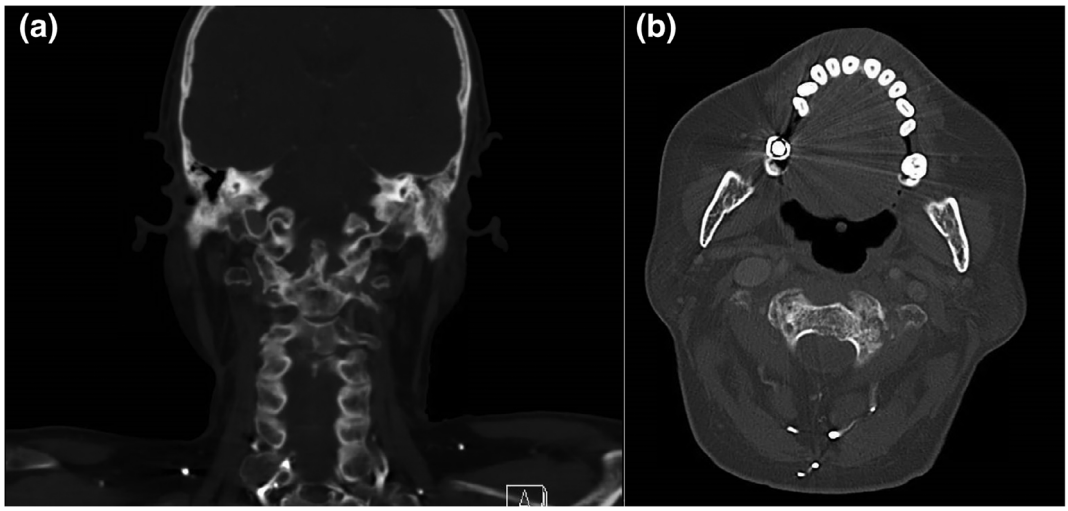

Fig. 3. (a) Coronal computed tomography (CT) of the cervical spine demonstrating subluxation of the right C1-C2 joint and the occipital-C1 joint and (b) axial CT of the cervical spine demonstrating a Fielding type 2 subluxation.

potential risks, and opted for conservative therapy with cervical spine immobilization with a collar.

Fifteen months post-op, the patient had minimal neck pain and no neurological deficits. There was no evidence of recurrent carcinoma. Inflammation appeared to be well controlled with an erythrocyte sedimentation rate of 2 mm/hr from an initial level of 85. A computed tomography scan of the neck and cervical spine was ordered to investigate a vague right-sided neck fullness. No masses or worrisome pathology was detected, but the coronal sections through the cervical spine revealed right lateral displacement of C1 on C2, and to a lesser extent, of the C1-occipital condylar articulation (Fig. 3a, 3b), which confirmed in a retrospective fashion our clinical suspicion of Grisel's syndrome. Based on the classification scheme by Fielding and Hawkins, this was a type II subluxation.[2] In view of persistent subluxation, the recommendation for surgical fixation was again made but the patient continued to refuse due to the risks involved, opting for a long-term rigid cervical collar and observation instead.

DISCUSSION

Nasopharyngectomy is an accepted treatment modality for recurrent NPC, and has become increasingly common in regions where NPC is endemic. Open or endoscopic approaches can be utilized with the latter favored for early stage, centrally located recurrent disease.[3–6]

Grisel's syndrome was first described by Sir Charles Bell in 1830, but only gained its eponymous name after a series of two patients was described by Pierre Grisel in 1930. Classically, children tend to be affected, presenting with torticollis and neck pain upon movement. It is thought that an infectious process incites an abnormal laxity in the ligaments around the atlanto-axial joint, which produces the symptoms above and can lead to neurological sequelae such as quadriplegia.[7–10]

Grisel's syndrome has been reported after a variety of infections, including tonsillitis, pharyngitis, adenoiditis, or deep neck abscesses. Infection is thought to spread from the oropharynx and nasopharynx to the atlanto-axial ligaments hematogenously, by way of pharyngo-vertebral veins which pierce the prevertebral fascia and drain into the plexuses around the odontoid. The inflammatory response then leads to hyperemia of the ligaments and joint capsules, causing a pathological laxity that allows abnormal rotation of the atlas on the axis. The resultant spasm of neck muscles gives rise to the torticollis and pain on neck turning that characterizes the condition.[7–10]

Certain otolaryngologic surgical procedures have also been identified as contributory to the development of Grisel's syndrome. In particular, adenoidectomy has been highlighted most frequently, although Grisel's syndrome has also been reported after tonsillectomy, mastoidectomy, pharyngoplasty, choanal atresia repair, or resection of parapharyngeal masses. These procedures all share the common risk for excessive neck extension intraoperatively, which could be another contributory factor for Grisel's syndrome. Adenoidectomy in particular may carry additional risk as the surgical bed is the prevertebral fascia itself, and infection here would be in direct proximity to the atlanto-axial joint.[7–10]

Grisel's syndrome is rarely seen in adults. To the best of our knowledge, less than 20 adult cases have been reported in the literature.[10–13] One could consider the role of nasopharyngectomy as analogous to adenoidectomy in children, as it involves the removal of the mucosa and soft tissue to expose the prevertebral fascia to microbes in the nasopharyngeal biome.

In our patient who had recurrent NPC, we hypothesize that previous treatment with radiotherapy leads to a disruption of microvasculature and lymphatics in the region of the cervical spine, which could lead to a predisposition to infection. Reduced microvasculature also has an impact on the efficacy of systemic antibiotics at the infected site.

The treatment principles in Grisel's syndrome generally involve the treatment of infection with antibiotics and stabilization of the cervical spine to prevent neurological

sequelae.[7–14] A management paradigm for atlanto-axial subluxation has been previously proposed by Wetzel and La Rocca based on the Fielding classification.[15] Conservative management is recommended for grade I, II, and III with the use of a soft collar, a rigid collar, and a halo vest, respectively. Surgery is indicated for grade IV pathology, as well as in patients who have recurrent or irreducible subluxation. While children generally respond well to nonoperative treatment, adults tend to require surgical management.[11–14] In our patient who had a persistent C1-C2 subluxation and pathological odontoid fracture with severe spinal canal stenosis, surgical decompression and fusion would provide definitive long-term stabilization.[11] However, he had superimposed cervical spine osteomyelitis, and ongoing infection in the surgical field could predispose the patient to implant infection and its sequelae. With cervical spine osteomyelitis, nonsurgical management can be considered in patients with no neurological deficits, good pain control, no epidural abscesses, and no significant deformities.[16] A cervical collar was thus used as a temporizing measure while awaiting resolution of the infection, before considering a delayed fusion or stabilization procedure. Our patient was later counseled for surgery, but was unable to accept the risks involved.

Our report is limited by the follow-up period and in the absence of surgical intervention, we are only able to describe the outcome of a conservative approach. Nonetheless, our report highlights and raises awareness of a hitherto unreported potential complication of nasopharyngectomy, which occurred despite antimicrobial precautions and measures to cover prevertebral muscle and bone with a vascularized nasoseptal flap during the initial surgical resection.

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