Velopharyngeal and choanal stenosis after radiotherapy for nasopharyngeal carcinoma

Jalal Hussein, Teck Soon Tan *, Aun Wee Chong, Prepageran Narayanan, Rahmat Omar

Department of Otorhinolaryngology, University Malaya Medical Centre, Lembah Pantai, Kuala Lumpur 59100, Malaysia

ARTICLE INFO

Article history:
Received 10 November 2011
Accepted 6 May 2012
Available online xxx

Keywords:
Choanal stenosis
Velopharyngeal stenosis
Nasopharyngeal carcinoma
Radiotherapy

ABSTRACT

Choanal stenosis is a well recognized late complication of radiotherapy for nasopharyngeal carcinoma. However velopharyngeal stenosis post radiotherapy for nasopharyngeal carcinoma is rare. We present here a case of bilateral choanal stenosis and velopharyngeal stenosis in a patient treated with radiotherapy for nasopharyngeal carcinoma. A 58-year-old woman presented to our otorhinolaryngology clinic with a one year history of nasal obstruction. She was diagnosed to have nasopharyngeal carcinoma 12 years ago for which she received radiotherapy. Clinical examination revealed bilateral choanal stenosis and velopharyngeal stenosis. Treatment of choanal stenosis and velopharyngeal stenosis is challenging due to high incidence of recurrence and patients frequently require multiple procedures. The patient underwent a transnasal endoscopic excision of velopharyngeal scar tissue and widening of posterior choana using Surgitron®, mitomycin-C applied topically to the surgical wound and bilateral stenting under general anesthesia. The stents were kept for two weeks, and 3 years post operation velopharyngeal aperture and posterior choana remained patent. As illustrated in this case velopharyngeal stenosis can occur after radiotherapy and should not be overlooked. Combine modality of transnasal endoscopic excision of velopharyngeal scar tissue, widening of choanal stenosis with Surgitron® followed by the application of mitomycin-C and stenting has been shown to be an effective option.

© 2012 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Velopharyngeal stenosis is rare. Historically majority of the cases were due to tertiary syphilis infection of the oropharynx and oral cavity. Today most cases are secondary to overzealous tonsillectomy, adenoidectomy or uvulopalatoplasty [1]. Velopharyngeal stenosis with choanal stenosis as a complication of radiotherapy has never been reported in English literature. Treatment of choanal stenosis and velopharyngeal stenosis respectively is challenging due to high incidence of recurrence and often patients may require repeated operations. We present a rare case of velopharyngeal and bilateral choanal stenosis as late complication of radiotherapy for nasopharyngeal carcinoma 12 years ago. We also review literature on treatment options and described our management of this patient which was successfully treated by combining two modalities (surgical and mitomycin-C as an adjunct).

2. Case report

A 58-year-old Chinese woman presented to our otorhinolaryngology department with a 1 year history of worsening bilateral nasal obstruction, anosmia and occasional epistaxis from both nostrils. Her past medical history included NPC diagnosed 12 years ago, American Joint Committee for Cancer (AJCC) T3N1M0 staging of T1NOM. She received a course of radiotherapy (70 gray in 37 fractions) for the NPC and patient was disease free ever since. Immediately post radiotherapy, patient experienced severe mucositis and dry oral cavity. She had no other significant past medical history.

On examination, patient was breathing with mouth open. A cold spatula test showed absence of air flow on left nostril and minimal air flow on the right side. Rigid endoscopic nasal examination revealed bilateral choanal stenosis but did not immediately reveal a velopharyngeal stenosis. Examination of the post nasal space through the choanal stenosis revealed a thick fibrous tissue occupying the velopharynx opening causing a near complete obstruction, leaving an opening of less than 5 mm on right lateral side only (Fig. 1A). Oral cavity examination revealed impaired mobility of the soft palate. There was no local-regional recurrence and no evidence of cervical lymphadenopathy. A computer tomography (CT) scan of nose and paranasal sinuses was done showed a soft tissue density lesion occupying bilateral choanae, with near complete closure of velopharynx opening with minimal opening on right lateral side (Fig. 1B). There was no evidence of recurrence tumor in the nasopharynx.

Patient underwent a transnasal endoscopic excision of velopharyngeal scar tissue and widening of posterior choanal stenosis using...
Surgitron®. A cotton pledget soaked in mitomycin-C of concentration 0.4 mg/ml was applied topically to the surgical wound using an endoscopic forcep under direct vision and held in place for 5 min. Bilateral stent with nasopharyngeal tube size 6 was inserted (Fig. 2). The stents were kept for two weeks. After removal of the stents, patient developed mild velopharyngeal incompetency which gradually recovered over a few weeks. Follow up in the clinic 2 years post operation, velopharyngeal aperture and posterior choana remained patent (Fig. 3A and B).

3. Discussion

Choanal stenosis is a well recognized late complication of radiotherapy for nasopharyngeal carcinoma (NPC) [2,3]. However velopharyngeal stenosis following radiotherapy is rare. The pathogenesis of postradiotherapy choanal stenosis is uncertain. It is thought that it may appear as a result of severe mucosal reaction that occurs after radiotherapy followed by fibrosis and scar tissue formation [4]. Hence patients with severe acute post radiation reaction are more prone to develop such complication, which may appear months to years after radiotherapy. Peter et al. reported that the occurrence of the posterior choanal stenosis or atresia is not related to dosage or technique of irradiation delivered to the patients [4]. We believe the pathogenesis of velopharyngeal stenosis in this patient can be also be explained by the above sequelae. The rarity of post radiotherapy velopharyngeal stenosis as compared to choanal stenosis in general, we believe can be explained by the frequent motion of the soft palate in our day to day activity hence limiting the formation of adhesion, fibrosis and scar tissue between the soft palate and the posterior pharyngeal wall.

Velopharyngeal stenosis can be graded into 3 types. Type 1 (mild, soft palate adhere to posterior pharyngeal wall), type 2 (moderate, opening 1–2 cm in diameter) and type 3 (severe, less than 1 cm opening) [5]. In our case the patient was thought to have a type 3 stenosis as the opening is only 5 mm. Clinically, patient’s symptoms are dictated by the degree of velopharyngeal stenosis. Patient can present with a varying severity of mouth breathing, snoring, rhinorrhea, hyponasality, dysphagia, otalgia, loss of hearing, and anosmia often overlap that of choanal stenosis. One must be mindful not to overlook the possibility dual stenosis. As in this case, velopharyngeal stenosis was not immediately obvious on endoscopic examination because it was obscure by the choanal stenosis. Detail examination through the choanal stenosis and from the oropharynx uncovered the velopharyngeal stenosis.

Treatment of choanal stenosis and velopharyngeal stenosis is challenging due to high incidence of recurrence. The definitive treatment is surgery. Various surgical procedures and approaches have been described to treat choanal stenosis and velopharyngeal stenosis, ranging from transpalatal, transeptal to endoscopic transnasal excision of scar tissue using either a powered shavers or a laser and using stents to maintain the opening [1,6,7]. Other methods include pharyngeal rotation flap and a free graft described by Chorayeb [8], Z-plasty technique described by Bennhoff [9] and a laterally based posterior pharyngeal wall flap described by Cotton [10].

Our patient underwent a transnasal endoscopic excision of velopharyngeal scar tissue and widening of posterior choanal stenosis using Surgitron®, mitomycin-C applied topically to the surgical wound and bilateral stenting under general anesthesia. Surgitron is a high frequency (4.0 MHz) radiosurgical device which minimizes heat dissipation and thus cellular alteration. This unit features a continuously linear power setting for precise, predictable control. This will promote faster healing with minimal scarring and serves to eliminate unfavorable post-operative conditions such as trauma, swelling and infection. The need for post-operative stenting remains a subject of intense debate. Some authors have advocated post-operative stenting to maintain the patency of the choana [11,12], while others have advocated no
stenting as they believe stents are associated with local infection, pain, formation of granulation tissue and nasal synchia [13,14]. The material and duration of stenting varies from one study to another with the latter ranging from few days to few months. Surgeons whom do not advocate post-operative stenting often have to perform serial dilatation to maintain patency of neochoana or revision endoscopy to remove crusts [11,14]. We feel that retention of stent for two weeks is optimum to maintain patency of the neochoana at the same time reduced the risk associated with stenting for prolonged period of time.

Mitomycin-C is an antibiotic produced by Streptomyces caespitosus [15]. It has long been used intravenously as an antineoplastic agent to inhibit deoxyribonucleic acid (DNA) and protein synthesis by causing single-band breakage and cross-linking of DNA at the adenosine and guanine molecules. Recently mitomycin-C has been increasingly used in various surgical fields due to its inhibition of fibroblast growth and migration property when applied topically [15].

At the cellular level, mitomycin-C exerts its effect by cross linking to DNA, not at a random site, rather it preferentially bind genes that are being induced. More specifically it is thought that it binds to induced extracellular matrix genes hence preventing their expression. It is also thought that mitomycin-C inhibit formation of fibroblast although the exact mechanism by which mitomycin-C exerts its antifibroplastic activity is unknown [16]. This results in decreased levels of extracellular matrix proteins and fibroblast. In a normal setting, these extracellular matrix proteins and fibroblast play a significant role in wound repair and scar formation. A reduction in fibroblast proliferation and extracellular matrix proteins is thought to reduce the amount of fibrous scar formation [16,17].

Although mitomycin-C is highly toxic, there has been no reported case of systemic toxicity when applied in a small amount topically [16,18,19]. Human studies have also demonstrated the efficacy and safety of mitomycin-C topically (0.4 mg/ml) in the treatment of airway stenosis [19].

Surgeons have successfully used mitomycin-C to maintain tracheal patency in glaucoma surgery, prevent or reduce laryngotracheal stenosis in laryngeal surgery, provide longer patency to myringotomy holes, sustain tear duct function after dacryocystorhinostomy, and maintain sinus drainage and decrease synchia after sinus surgery [15]. In this case it has also shown to be a useful adjunct to surgical treatment for velopharyngeal stenosis.

4. Conclusion

Although velopharyngeal stenosis is not a recognize complication of radiotherapy. As illustrated in this case velopharyngeal stenosis can occur after radiotherapy and should not be overlooked especially in the presents of choanal stenosis obscuring the diagnosis as failure to recognized the condition will result in mismanagement or incomplete treatment of patient's symptoms. Transnasal endoscopic excision of velopharyngeal stenosis by using Surgitron® is safe with good operative field vision, minimal blood loss and faster healing. Intraoperative topical use of mitomycin-C is safe and effective. Combine modalities of transnasal endoscopic excision of velopharyngeal scar tissue, widening of choanal stenosis with Surgitron® followed by application of mitomycin C and stenting has been shown to be an effective option for managing acquired fibrous membranous cause of stenosis or atresia of the velopharynx and choana.

Conflict of interest

None.

References


