

## Editorial Review

# Arytenoid granuloma

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Vocal fold granulomas are benign growths of hypertrophic granulation tissue, most often occurring at the vocal process of the arytenoid. Granulomas are thought to begin as ulceration of the laryngeal mucosa. Continued inflammation and repetitive injury produces granulation tissue. Granulomas frequently develop following mucosal injury caused by laryngeal endoscopic procedures, endotracheal intubation or after partial laryngeal surgery. Granulomas are prone to recurrence because phonation and coughing places them in contact with the opposite arytenoid which causes repeated injury.

Clinically there are two scenarios: the patient who has recently undergone some instrumentation to the larynx, or the patient who presents without any local trauma to the larynx and has a granuloma on the arytenoid – either idiopathic or acquired. These benign growths also occur in persons who abuse their voices, almost exclusively seen in men over the age of 30 years (Kleinsasser, 1978) and in individuals with gastroesophageal reflux (Svensson *et al.*, 1988).

### Post-intubation laryngeal granuloma

One of the sequels of laryngeal manipulation and intubation is the risk of post-intubational laryngeal granuloma. This type of granuloma nearly always occurs on the vocal process of the arytenoid cartilage. Considering the extent to which endotracheal intubation has been and is practised, post-intubation granulomas are rare, although they occur often enough to be a clinical problem both for the patient and the laryngologist. Traumatic injury to the larynx results in either primary or secondary healing. The difference between primary and secondary healing is defined by the presence of a gap in the surface of subepithelial tissue and the absence of contact with another surface of normal subepithelial tissue (Bales-trieri and Watson, 1982). It is difficult to obtain primary healing in the larynx because of the loose unsupported surface epithelium and it nearly always occurs by secondary intent. Healing is further hindered by constant stretching and expansion of the larynx during respiration, swallowing and head movement. It has been shown that regeneration of epithelium in superficial ulceration begins in the basement membrane when the layer is intact. However, if the basement layer has been destroyed, a considerably slower healing process or granulation, takes place inwards from the edges of the ulcerated tissue. All post-intubation granulomas in the litera-

ture have been reported in adults, the youngest patient being 15 years. This may be explained because of the loose areolar tissue in the laryngeal submucosa. It may also be because of the higher location and tapering of the infant larynx which displaces the mechanical forces toward the subglottis. Females account for more than 75 per cent of reported cases (Epstein and Winston, 1957) and this fact must be considered when choosing the size of the endotracheal tube as a smaller size than would be used in a similarly aged adult male is necessary. The size, composition and shape of the endotracheal tube is considered the most important factor causing laryngeal trauma (Santos *et al.*, 1989). In a prospective study to evaluate the potential risk factors associated with laryngeal injury after prolonged (longer than three days) endotracheal tube intubation it was shown that 97 patients (44 per cent) developed a granuloma (Santos *et al.*, 1994). The majority of the granulomas (57 per cent) developed an average of four weeks after extubation. This risk was associated with the duration of the endotracheal tube and the presence of an nasogastric tube. The majority of the granulomas seen resolved between eight and 14 weeks after extubation. It was felt that the presence of the nasogastric tube acted to compromise the upper and lower oesophageal sphincters, allowing gastroesophageal contents to bathe the posterior glottis. As a result, laryngeal injuries initiated by other processes such as the endotracheal tube are probably exacerbated, resulting in further injury such as ulceration and granuloma formation. Increasing age was also found to be associated with more severe complications from prolonged endotracheal intubation. The authors recommend: 1) avoidance of large-sized endotracheal tubes, size 8 if prolonged intubation is to be expected; 2) if a nasogastric tube is medically indicated, consider the use of concomitant histamine 2 (H<sub>2</sub>) blockers; 3) if after a prolonged period of intubation a patient experiences hoarseness or aphonia or is unable to speak, examine the larynx to rule out delayed onset of laryngeal granuloma or immobility; 4) a tracheostomy should be considered within one to two weeks if prolonged intubation is anticipated.

### Contact ulcers

Jackson is cited with describing contact ulcers of the posterior larynx (Jackson, 1928). He updated his experience some years later (Jackson and Jackson,

1935) by adding further cases to his previous experience. He stated that 'necrosis of the epithelium may allow infective agents under the epithelial barrier', and 'in infected areas, trauma to cartilage and perichondrium results in slow healing: reparative processes are retarded by exuberant, flabby granulations that persist so long that they epithelialize and more or less organize: they then constitute granulomas'. Recent reviews of vocal fold granulomas proposes that contact ulcers and granulomas are different stages of the same pathological process and should be regarded as separate entities (Benjamin and Croxson, 1985). It is likely that there are two distinct entities (ulcer and granuloma) as well as a progression from one to the other (McIlwain, 1991). Histologically the lesions are composed of non-specific reparative granulation tissue consistent with pyogenic granuloma. The granulation tissue is covered by squamous epithelium, usually hyperplastic but it may be ulcerated. A histopathological classification (Grade I-IV) of arytenoid granulomas has been formulated based on the degree of injury to the overlying vocal fold epithelium, the propria mucosa, and/or the cartilaginous membrane of the arytenoid cartilage (Shin *et al.*, 1994).

The causes of arytenoid granulomas has been questioned over many years. Post-intubation granuloma following manipulation of the larynx, including traumatic laryngoscopic examination is an obvious cause (Jackson, 1953; Snow, 1966). Ward *et al.* (1960), concluded that habitual throat clearing, excessive glottal attack, and most importantly acid regurgitation secondary to hiatus hernia were the major causal factors. He stated that these patients often abused their voices by excessive speaking, were hard-driving, tense people who were likely to be late eaters, heavy drinkers, banquet attenders and public speakers. Feder and Michell (1984) classified granulomas as hyperfunctional or hyperacidic and proposed that both groups had vocal abuse as a primary aetiological factor.

The most common presenting symptom is hoarseness, following intubation for anaesthesia, usually within 12 months. Sore throat and aching throat, a constant irritation within the throat are less common presenting symptoms. Other symptoms recorded at presentation include, dyspnoea on exertion, a feeling of something in the throat, stridor and 'cut off vocalization'.

It has been suggested that non-specific granulomas develop on a pre-existing contact ulcer. However, this is difficult to prove. Benjamin and Croxson (1983) suggested that ulcers and granulomas when diagnosed should be considered as separate entities.

The differential diagnosis of granuloma in the larynx may include tuberculosis, histoplasmosis, coccidioidomycosis, blastomycosis, syphilis, leprosy, sarcoidosis, Wegener's granuloma, scleroma and Crohn's disease (Ward *et al.*, 1960). Autoimmune deficiency syndrome (AIDS) has recently been reported with granuloma formation in the larynx (Desai and Rajratnam, 1988). The benign tumour

granular cell myoblastoma, though uncommon, has a predilection to appear on the vocal process of the arytenoid (Jones *et al.*, 1984).

The goals of clinical management are to rule out neoplasm, to ensure airway patency and to provide symptomatic relief. Treatment is directed at resolving any acute inflammation with antibiotics, voice rest or inhalation of steroids. The possibilities to treat the condition are limited since the aetiology is frequently unknown. In a review of a patient group (Svensson *et al.*, 1988) it was felt that gastro-oesophageal disorder was not the only cause of the laryngo-hypopharyngeal hyperfunction seen in the patients studied. The common sign seen in all the patients was the hawking behaviour, probably secondary to the local irritation of the mucosa in the region of the convergence between the upper and lower digestive tracts. Therefore any irritative agent including gastro-oesophageal reflux, if applied to this area may cause the laryngeal hyperreactivity followed by hawking behaviour and repeated laryngeal microtrauma. Since the idiopathic granulomas almost exclusively occur in middle-aged or elderly non-smoking men constitutional and sex related factors should be considered. Management of arytenoid granulomas initially should be intensive medical management prior to any excision unless airway compromise is a factor. Treatment with omeprazole, 40 mg/day, guaifenesin, 2400 mg/day, and speech therapy. Failure of medical therapy warrants surgical excision. Speech therapy is beneficial even if surgery is required, because granulomas tend to recur in vocal abusers and in patients with high vocal demands (Shin *et al.*, 1994).

The indications for surgical removal is the severity of the dyspnoea on exertion or nocturnal dyspnoea caused by the size of the mass. Surgery if used should be a combined microsurgical techniques and the CO<sub>2</sub> laser. The manoeuvre should include grasping the granuloma and sharply excising the base. Under high magnification, the base of the granuloma should be lasered to control the bleeding. Do not remove normal mucosa nor add to further exposure of the perichondrium. Biopsy is indicated if the diagnosis is in doubt and to confirm accuracy of diagnosis. Small granulomas should not be removed but should be regularly viewed and documented photographically at frequent intervals during conservative treatment. Other non-surgical treatments should be utilized at the same time, speech therapy, cessation of smoking, local injections of steroids and the use of botulinum toxin (Nasri *et al.*, 1995), have been effective in eradicating this disorder. The use of low dose radiotherapy has also been used with good effect (Harari *et al.*, 1991). Voice functions are described in the literature as poor following surgery for granuloma removal, with hoarseness and vocal fatigue more prevalent in surgical as compared to non-surgical patients (Peacher, 1961). However a more recent review suggests that if the granuloma does not encroach onto the vocal fold membrane then altered voice quality will not result (Verdolini *et al.*, 1994).

Arytenoid granuloma is frequently diagnosed as a cause of dysphonia in adults. The underlying precipitating factors that may have initiated the granuloma formation should be sought as persistence and probable recurrence of the condition are frequent. Three modes of treatment have been advocated – speech therapy and patient education, anti-reflux measures and, with reluctance, laser surgical excision if the granuloma fails to resolve by conservative medical manoeuvres. Despite general consensus regarding the symptoms of non-specific laryngeal granulomas and treatment approaches, little quantitative, normative referenced information is available about voice with these lesions and functional outcomes of different treatment approaches (Hillman *et al.*, 1989). Currently it is considered that reflux is an important factor as smoking in the development of laryngeal carcinoma (Kaufman and Burke, 1997).

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