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The surgical management of dysphagia secondary to diffuse idiopathic skeletal hyperostosis

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ABSTRACT

Objective: This study reviews the management pathway and surgical outcomes of patients referred to and operated on at a tertiary neurosurgical centre, for dysphagia associated with anterolateral cervical hyperostosis (ACH) in diffuse idiopathic skeletal hyperostosis (DISH).

Patients & Methods: Electronic patient records for 6 patients who had undergone anterior cervical osteophytectomy for dysphagia secondary to ACH were reviewed. ACH diagnosis was made by an Ear, Nose and Throat (ENT) specialist and patients were referred to a neurosurgical-led multidisciplinary team (MDT) for review. A senior radiologist performed imaging measurements and vertebral level localization was confirmed via barium-swallow video-fluoroscopy. Speech and language therapists (SLTs) determined the suitability of pre-operative conservative management. Patients were followed-up post-operatively with clinical and radiological assessments.

Results: 6 patients (Male to female ratio, 6:0; mean age, 59 years) were referred to a tertiary neurosurgical centre with DISH related dysphagia, an average of 25 months after ENT review (range, 14–36 months) between 2005 and 2016. The vertebral levels implicated in dysphagia ranged from C2 to T1 with a median of 4 vertebral levels involved. The most frequently affected vertebral levels were C4-6 (all 6 patients). The average antero-posterior height (as measured on axial images) of the most prominent osteophyte was 15.9 mm (range 12.0–20.0 mm).

Patients underwent elective cervical osteophytectomy on average 10.8 months after neurosurgical review (range, 3–36 months). One patient had a post-operative haematoma needing evacuation and prolonged hospital stay. The average duration of follow-up was 42.3 months. All our patients maintained good symptomatic resolution without osteophyte recurrence.

Conclusions: All our patients experienced significant and sustained clinical improvement. Anterior cervical osteophytectomy consistently leads to improvement in symptomatic ACH patients without recurrence. Early referral to a neurosurgical multi-disciplinary team (MDT) is indicated in ACH related dysphagia, once conservative management has failed.

1. Introduction

Diffuse idiopathic spinal hyperostosis (DISH) is a common albeit under-diagnosed condition. Resnick and Niwayama classified DISH as; the presence of flowing calcification and ossification along the anterolateral aspects of at least 4 contiguous vertebral bodies, with a relative preservation of disc height, in the absence of extensive degenerative disease or ankylosis [1]. The prevalence of DISH is reported to be as high as 27.1%, increasing with age and demonstrating a male preponderance of up to 6:1 [2,3].

DISH affecting the cervical vertebrae can be referred to as anterolateral cervical hyperostosis (ACH) [1]. ACH is seen in up to 78% of DISH cases and is associated with clinical symptoms including: reduced range of movement, dysphagia, dysphonia and dyspnoea [1,3]. Multiple pathophysiological mechanisms have been used to explain ACH symptomatology, including; direct mass effect, neuropathy and inflammation of adjacent soft-tissue structures [3–6]. The incidence of dysphagia secondary to ACH, ranges from 0.1–33%, with 8–10% requiring surgical treatment [4,6].

Conservative management options for ACH-related symptoms include diet modification, speech and swallow therapy, and anti-inflammatory medication [7,8]. In extreme cases, enteral feeding, gastrostomy and tracheostomy may be indicated [8]. Surgical management in the form of anterior cervical osteophytectomy is considered to be

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highly effective [5,7,8] and has been recommended on: (1) failure of conservative management, (2) increased dysphagia with unintentional weight loss or (3) the appearance of laryngeal signs [9].

Based on our institutional experience, this study reports on the surgical management and outcomes of patients diagnosed with dysphagia secondary to ACH.

2. Materials and methods

A retrospective review of the hospital records of patients undergoing anterior cervical osteophytectomy for DISH related dysphagia at a tertiary referral academic institution was performed.

Six patients were identified between 2005 and 2017. All patients were referred by their primary physician for ENT review. ENT specialists diagnosed dysphagia due to DISH after ruling out other causes of dysphagia, including intrinsic oesophageal dysfunction. The average time from initial ENT review to neurosurgical review was 25 months (14–36 mo).

Patients were subsequently referred to neurosurgeons, who led a multidisciplinary review of these patients. A senior radiologist confirmed the diagnosis of DISH and established ACH was implicated in dysphagia, with the use of the IMPAX radiological suite (Phillips) (spine radiographs, CT and MRI) and barium video-fluoroscopy.

3. Results and discussion

All 6 patients were male, aged between 43 and 74 years (see Appendix Table A1). 4 patients were of South Asian ethnicity and 2 were Caucasian. 2 were obese (BMI > 30), the only significant risk factor suggested for DISH [10]. 5 patients had a history of hypertension, 3 had type 2 diabetes mellitus, and 2 had a smoking history. One patient presented without any known co-morbidities.

All patients presented with dysphagia and at least one further clinical manifestation of ACH (see Table 1). The severity of dysphagia was classified as mild, if able to swallow solid food; moderate, if only able to swallow liquids; and severe, if unable to swallow fluids at all [3]. 5 patients complained of moderate dysphagia and one patient with severe dysphagia.

Subjective reporting was used to determine the presence or absence of other clinical manifestations associated with cervical DISH. Of these other clinical manifestations, 3 patients suffered from subjective reduced range of neck movement, weight loss, odynophagia or dysphonia. 2 patients suffered from dyspnoea and sleep apnoea. One of the patients had sleep apnoea independent of obesity, suggesting a direct relation to DISH.

Table 2
Radiological characteristics as identified by swallow studies and CT/MRI.

Patient	Cervical and thoracic vertebral levels affected by DISH (No. of vertebrae)	Level of oesophageal compression identified via video-flouroscopy	Maximum height of osteophyte (mm)
1	C3-T1 (7)	C4-6	17
2	C2-T1 (8)	C2-5	20
3	C3-6 (4)	C3-5	16.5
4	C4-6 (3)	C4, 5	16
5	C4-7 (4)	C5-7	14
6	C4-6 (3)	C5	12

CT and MRI scans were used to determine the extent of ACH [2]. The vertebral levels implicated in dysphagia ranged from C2 to C7 with a median of 3 vertebral levels involved (See Table 2). The most frequently affected vertebral levels were C4-6 (all patients), with C4 and C5 most commonly implicated in dysphagia. The average antero-posterior height (as measured on axial images) of the most prominent osteophyte was 15.9 mm (range 12.0–20.0 mm).

Patients waited on average 10.8 months from initial neurosurgical review to surgery. This however included one patient (patient 3) who opted for additional speech and language therapy (SALT) prior to surgery, with a time from neurosurgical review to surgery of 36 months.

All 6 patients underwent anterior cervical osteophytectomy (Smith Robinson approach) without spinal fusion. One patient (Patient 2) underwent a planned pre-operative awake tracheostomy due to significant DISH-related airway obstruction. One patient (Patient 3) suffered from a post-operative complication - a haematoma requiring evacuation and admission to an intensive care unit

Clinically significant improvement was recorded in all patients at last follow-up (see Table 1). Patient 3 reported occasionally mild dysphagia with solids and improved, albeit continued, reduced range of neck movement. Patient 4 reported relative improvement of dysphonia. The average follow-up for patients was 42.3 months (12–150 mo). No patients have demonstrated recurrence of osteophytes associated with DISH.

Our surgical technique uses the standard Smith Robinson approach. We use a generous horizontal mid-cervical skin crease incision. Platysma is split longitudinally. This allows generous access from C2

Table 1
Pre- and post-operative severity of dysphagia, other extraspinal manifestations of cervical DISH and follow-up for osteophyte recurrence.

Patient	Dysphagia		Reduced range of neck movement		Dyspnoea		Dysphonia	
	Pre-op	Post-op	Pre-op	Pre-op	Pre-op	Post-op	Pre-op	Post-op
1	Moderate	N	Y	N	Y	N	Y	N
2	Severe	N	Y	N	Y	N	N	N
3	Moderate	Occasionally mild	Y	Y*	N	N	Y	N
4	Moderate	N	N	N	N	N	Y	Y*
5	Moderate	N	N	N	N	N	N	N
6	Moderate	N	N	N	N	N	N	N

Patient	Odynophagia		Sleep apnoea		Weight loss		Osteophyte recurrence at last follow-up
	Pre-op	Post-op	Pre-op	Post-op	Pre-op	Post-op	
1	N	N	Y	N	Y	N	N
2	Y	N	N	N	N	N	N
3	N	N	N	N	Y	N	N
4	N	N	N	N	N	N	N
5	Y	N	N	N	Y	N	N
6	Y	N	Yˆ	Yˆ	N	N	N

Y = symptoms reported, N = no symptoms reported, *relative improvement reported, ˆsymptom unrelated to ACH.