Original Articles

Cricopharyngeal myotomy in neurogenic oropharyngeal dysphagia

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ABSTRACT

Objective: Cricopharyngeal myotomy as an independent procedure has been performed on fourteen patients with a variety of neuromuscular disorders, suffering from neurogenic oropharyngeal dysphagia in the interval between 1994-1997. All of them were referred from a neurophysician or physiatrist after failure of improvement by medical treatment.

Methods: The selection of patients for operation was based mainly on clinical evaluation and simple exclusion criteria without manometric studies.

Results: There was dramatic improvement in twelve, with recurrent laryngeal nerve palsy and temporary pharyngeal fistula in two patients. No mortality was recorded.

Conclusion: We conclude that cricopharyngeal myotomy is a simple, safe and effective procedure with acceptable morbidity. It should be considered as a rehabiliation procedure for patients with dysphagia due to various neurologic disorders based on simple, clinical exclusion criteria without the need for the tedious, time consuming and expensive manometric studies.

Keywords: Dysphagia, neuromuscular disorders, myotomy, cricopharyngeus.

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Oropharyngeal dysphagia is a distressing symptom that is associated with various neuromuscular disorders. Initially, cricopharyngeal spasm and achalasia were implicated as the pathological feature [1], but cineradiographic and manometric studies have supported the idea of normal relaxation followed by premature contraction of the cricopharyngeus before the pharyngeal contraction has finished.[2] Therefore, changes in the form and function of this area, leading to dysphagia are not difficult to assimilate and Blakeley has wisely called it: "neuromuscular incoordination of the upper oesophageal sphincter". He classified its causes into central, peripheral, myopathic and idiopathic groups.[3] The indications for cricopharyngeal myotomy can be classified into two major groups : structural alteration and muscular incoordination. It is the second indication which will be discussed at greater length. In this paper we are presenting our experience with cricopharyngeal myotomy performed on 14 patients who suffered from the above symptom. The clinical indications, investigations. anatomy, surgical procedure and a comprehensive review of the relevant literature are discussed.

Methods. Patients with neurogenic oropharyngeal dysphagia and no local structural abnormality were referred to the Ear, Nose and Throat Department at Princess Basma (Jordan University of Science and Technology - Irbid) and

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Table 1 - Clinical features.

Symptom	Number of Patients
Dysphagia	14
Solids	14
Liquids	12
Odynophagia	10
Regurgitation	14
Pharyngo-oral	14
Pharyngo-nasal	10
Aspiration	12
Pneumonia	5
Weight loss	11

Islamic Hospitals (Amman), over the three years period 1994 - 1997, formed the skeleton of this study. The above two hospitals have a large amount of experience with good results in this field and they serve a wide sector of our population. Fourteen patients who were confirmed as having muscular incoordination of the upper oesophageal sphincter and who failed conservative management from the neurology and physiotherapy departments aimed at restoring normal swallowing, had cricopharyngeal myotomies performed.

The fourteen cases were refractory to treatment and had additional problems of either significant weight loss or chest infections from spill-over and aspiration. There were eight males and six females. Their ages ranged from 12-65 years (mean :44.7). Symptoms reported by the patients are summarized in Table 1. Dysphagia to solid food associated with pharyngo-oral regurgitation was noticed in 100% (14/14), while dysphagia to liquids was seen in 85.7% (12/14) and pharyngonasal regurgitation in 71.4% (10/14). Pain on swallowing (odynophagia) was recorded in 71.4% (10/14). Aspiration was documented in 85.7%(12/14), although pneumonia occurred only in 35.7% (5/14). Weight loss was recorded in 78.6% (11/14). The period of conservative management ranged from 12-24 weeks (mean 18.1). This long interval between commencement of symptoms and myotomy was meant to any doubt about spontaneous resolution of dysphagia. The high percentage of aspirations, pneumonia and weight loss confirmed the severe

Table 2 - The demographical data, diagnosis and results of myotomy.

Case	Age	Sex	Diagnosis	Result	Complication
1	57	Female	Myopathy	Successful	-
2	25	Male	Peripheral Neuropathy	Successful	-
3	17	Male	Central (head trauma, brain contusions, quadriplegia)	Failed	-
4	12	Female	Central (brain anoxia)	Successful	Fistula
5	45	Male	Central (extensive right basal ganglia and thalamic infarction)	Successful	-
6	50	Female	Central (extensive left basal ganglia, thalamic infarction and pharyngeal pouch)	Successful	Left recurrent laryngeal nerve palsy
7	60	Female	Central (head trauma, right subdural and central haemorrhage, hemiplegia)	Successful	-
8	28	Male	Lateral Medullary Syndrome	Successful	-
9	60	Female	Central (bilateral cerebral infarctions, quadriplegia)	Failed	-
10	65	Male	Motor Neurone Disease	Successful	-
11	62	Male	Parkinson's Disease	Successful	-
12	50	Female	Oculopharyngeal Dystrophy	Successful	-
13	40	Male	Lateral Medullary Syndrome	Successful	-
14	55	Male	Extensive right basal ganglia and thalamic infarction	Successful	-

incoordination of the cricopharyngeus. The referral of the cases for operation was a joint decision between the neurologist (observer 2) and the physiatrist (observer 1). This was only done after a detailed history and clinical examination concentrating on tongue mobility and spasticity of the muscles of mastication. Tracheo-oesophageal problems were excluded by the relevant investigations whenever suspected clinically. Dysphagia as a symptom of the quoted diseases is self explanatory. Extensive basal ganglia and thalamic infarction is associated with severe dysphagia in over one-third of cases.[3]

The surgical technique approaches the sphincter from either side but most surgeons seem to prefer the left. Clear exposure can be obtained with a skin crease incision at the level of the hyoid and it leaves a cosmetically more acceptable scar than an oblique incision paralleling the sternomastoid muscle. After division of the superficial layer of the deep fascia, the carotid sheath and its content are retracted laterally with the omohyoid being retracted or divided.

Myotomy is not effective unless all the fibers are divided by sharp dissection down to the mucosa.[4] To achieve this, the muscle must be stretched by passing an anaesthetic endotracheal tube into the upper oesophagus. The cricopharyngeus is a single muscle with no median raphe, so a single division is sufficient. This division may be continued a little on either side into the inferior pharyngeal constrictor and upper oesophagus and if done in the posterior midline, there is no risk to the recurrent laryngeal nerve. The wound is closed in layers with a drain and swallowing can be started on the second post-operative day.

Results. The demographical data, the diagnoses and the results are outlined in Table 2. Twelve patients ate normal meals on the second post-operative day and remained free from swallowing problems since, the procedure failed to relieve dysphagia in two patients. The postsurgical clinical outcome was graded as excellent (complete relief of all swallowing symptoms) in 71.4% (10/14), good (minor symptoms that persisted but did not require therapy) in 14.2% (2/14) or poor (presurgical symptoms persisted or became worse) in 14.2% (2/14). The mean postsurgical follow up was 12 months (range 2-48). There were no deaths within 30 days after surgery. The postsurgical morbidity rate was 14.2% (2/14). The median hospital stay was 4 days (range 2-29). All 12 patients with successful results had an excellent or good outcome. This occurred in 83.3% (5/6) of the patients who had a prior cerebrovascular disease. Over all, 14.2% (2/14) had a poor outcome. This was the result of persistent dysphagia and continued aspiration. The two patients had quadriplegia, one due to head trauma and multiple brain contusions and the other due to multiple brain infarctions. The two cases listed as a failure were graded as poor outcome because they did not resume acceptable swallowing after four and six weeks respectively and hence the value of myotomy in both is in doubt. The two patients were quadriplegic with bilateral lower cranial nerve palsies, therefore the restricted tongue movements and the difficult initiation of the act of swallowing were primary problems.

The complications of myotomy consisted of left recurrent laryngeal nerve palsy in one and pharyngeal fistula in another patient, the later event occurred in a twelve year old child with muscular incoordination, however, this has settled conservatively. The recurrent laryngeal injury was observed in a fifty year old lady who was found to have a pharyngeal pouch with extensive adhesions, in addition to her neurological problem. The myotomy in this case was performed at the lateral aspect.

Discussion. Swallowing is definitely a complex mechanism and it consists of oral and pharyngeal phases. Incoordination of these two phases will produce dysphagia. The symptoms of cricopharyngeal incoordination range from vague sensations in the throat to severe and recurrent aspirations and weight loss. The cricopharyngeal sphincter is a neuromuscular sling connecting the two lateral borders of the cricoid, and passing across the posterior wall of the pharynx to blend inferiorly with the circular and longitudinal muscle fibers of the oesophagus and superiorly with the inferior constrictor muscle of the pharynx. It is of utmost importance to note that it does not attach into a median raphe like the above bordering muscle . It is a single muscle, so a single division[5] during surgery regardless its site is sufficient, though it is recommended to be done posteriorly in the midline so as to avoid complications. However, we do not recommend the performance of myotomy at the lateral aspect of the muscle because this will lead to recurrent laryngeal nerve palsy (case no.6). Tissue organization at the pharyngoesophageal junction (PEJ) does not give clear demarcation of the sphincter and so the exact pharyngeal or oesophageal location of it is debatable. Based on this fact, it was found recently that extension of the cricopharyngeal myotomy over the distal hypopharynx produces a more significant decrease of the resting pressure at the PEJ.[6]

The clinical indications for cricopharyngeal myotomy are protean[7-10] and include a wide variety of neurological disorders. The dysphagia should be localized to the upper neck and not associated with a structural abnormality like a foreign body or neoplasm. A detailed history and clinical

examination is mandatory. Endoscopic examination is required to exclude such causes. Routine Barium swallow is not useful in all cases and usually fails to give a clear interpretation of the upper oesophageal sphincter.[11] Cineradiography may be required, although consistent and reproducible results are possible with manometric studies. However, the later studies are tedious, impractical and time consuming. Therefore, we noticed that tongue movements and the initiation of the act of swallowing were the most decessive and cheap single clinical criterion in the selection of patients and prediction of the results of myotomy. The procedure can be done in patients with oropharyngeal dysphagia as long as they can protrude their tongues beyond their teeth. Earlier, it was noticed that the quality of residual pharyngeal propulsion appears to be the determining element in operative success and should be used in determining indications.[12] Later on, it was found that intact oral phase deglutition is the most important decisive factor in the operative success of cricopharyngeal myotomy in patients with neurogenic oropharyngeal dysphagia.[13]

The cricopharyngeal myotomy is not effective in all cases of dysphagia. However, it should be the specific treatment in cases of dysphagia caused by primary cricopharyngeal muscle dysfunction.[14] Vidioflourography and manometric studies, although time consuming and expensive could predict success in a variable percentage of patients. However, even with the most sophisticated clinical and investigatory techniques used for selection of patients indicated for myotomy, there is still a smaller minority of patients who will fail to respond by all means.[15]

The use of manometric studies have led to improvements in the outcome that varied between 70 and 89% in the various studies.[8,9,12-14,16] Our results have shown 86% success without the use of manometric studies. This result is practically not different from those recorded in the above mentioned studies and although the number of patients is relatively small in our study, the number of patients in the above studies ranged also from 5-40. The role of cricopharyngeal myotomy in the management of neurogenic oropharyngeal dysphagia remains controversial.[12-15] However, a review of the literature regarding outcomes in the sitting of a variety of neurological disorders indicates a preponderance of favourable results. Certainly, it is an effective mode of management in carefully selected patients. The appropriate selection criteria include : Intact voluntary initiation of swallowing, adequate propulsive force generated by the tongue and pharyngeal constrictors and a relatively favourable neurological prognosis. However, it is very important to know the limits and contraindications of this procedure in cases with immobile tongue and severe trismus due to spastic paralysis of the muscles of mastication and swallowing (case no. 3 & 9).

Finally, cricopharyngeal myotomy is not a common operation. However, as an independent procedure it is indicated in a variety of neuromuscular disorders with or without a diverticulum.[7-9,12-17] It is not recommended in young children and on the lateral aspect of the muscle [18,19] because of increased tendency to complications (case no. 4 & 6). In cases of bulbar palsy secondary to cerebrovascular accidents, patients may not recover enough to regain normal swallowing, being a simple and safe procedure, myotomy can be offered to many of them. Successful outcome was achieved in 83.3% (5/6) of our patients who had prior cerebrovascular disease. However, patient selection is usually associated with excellent or good results.[15]

Therefore, in selected patients of cerebrovascular accidents and other neuromuscular disorders, primary or secondary, simple division of the cricopharyngeus muscle in the midline posteriorly is a safe procedure with minimal morbidity. The value of myotomy in the above mentioned categories is obvious. So, it should be considered as a part of the rehabilitation process of such patients, based on simple clinical and exclusion criteria and without the need for the tedious, time consuming and expensive manometric studies.

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