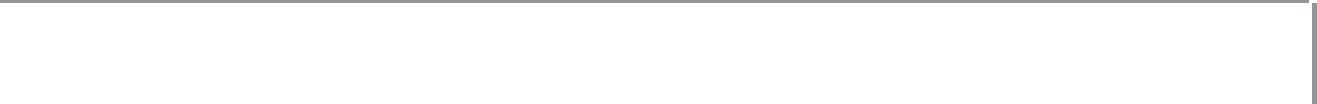


# 9

## Summary





## SUMMARY

**D**ysphagia is defined as difficulty in swallowing, in such a way that passage of the food-bolus is disrupted. Dysphagia can present both a difficulty in swallowing solid and/or liquid food. Another major deglutitive problem is aspiration. Aspiration is defined as entering of fluids or occasionally even a solid bolus into the airways, which can result in recurrent pneumonias or even asphyxiation if the bolus is so large it can block the airway. Aspiration can occur in combination with dysphagia. In order to understand what causes dysphagia or aspiration it is important to understand the physiology of swallowing.

## CHAPTER 1: GENERAL INTRODUCTION

Swallowing is partly controlled voluntary, and partly controlled by a complex reflex activity. Fifty different muscles guarantee the processing and transport of food and fluids in this way. Swallowing is generally divided into four phases: 1) The oral preparatory phase, which serves for chewing and mixing of food with saliva. 2) The oral phase, where the bolus is transported in the oropharynx by the tongue and the swallow-reflex is induced. 3) The pharyngeal phase, where the bolus is transported by a complex of reflex controlled muscle activity through the pharynx into the esophagus, during which the airway is closed. 4) The esophageal phase, where the bolus is transported to the stomach by peristaltic movements. In order to determine the causes of dysphagia different diagnostic tests can be used. Fiberoptic endoscopic evaluation of swallowing (FEES) with or without tactile stimulation to test sensibility (FEESST), videofluoroscopy, manometry and scintigraphy are described.

## CHAPTER 2: DYSPHAGIA CAUSED BY RETROPHARYNGEAL MASSES ORIGINATING FROM THE CERVICAL SPINE

### Chapter 2A: Anterior cervical osteophytes

In this chapter dysphagia induced by external compression of the pharynx and esophagus by anterior cervical osteophytes is discussed. Anterior cervical osteophytes are the most common causes of compression, especially in the elderly, although not frequently diagnosed, and mostly seen in diffuse idiopathic skeletal hyperostosis (DISH).

Videofluoroscopy can both detect the osteophytes and provide information regarding the dynamic aspects of swallowing and the dysphagia. If therapy is indicated it is mainly by adaption of food bolus or anti inflammatory drugs in case of perifocal irritation. Resection of the osteophytes themselves is rarely required and is reserved for severe cases with large bony osteophytes. Two cases are reported with severe

dysphagia and aspiration in which surgical resection by an anterolateral external approach of large bony osteophytes alleviated all symptoms.

### **Chapter 2B: Multiple anterior cervical meningoceles**

In this chapter a case is reported where anterior cervical meningoceles, which are rarely reported in literature, caused a retropharyngeal swelling resulting in severe dyspnea and dysphagia. The meningoceles, protrusions of spinal meninges through a defect in the vertebral column or foramina, were a consequence of Neurofibromatosis type 1. MRI is the preferred diagnostic tool for non-inflammatory retropharyngeal masses and accurately demonstrates the morphologic properties of a lesion. The probability of the gradual enlargement of an anterior meningocele with time and the possibility that it may cause dysphagia and dyspnea should be weighed against the risks of surgery. In the presented case successful surgical intervention was performed and the process of deglutition normalized.

## **CHAPTER 3: ENDOSCOPIC ZENKER'S DIVERTICULOTOMY**

A Zenker's diverticulum can develop in a weak spot in the musculature of the hypopharynx known as Killian's triangle and presents a relatively common problem encountered by head and neck surgeons. Retention of food and fluid in the diverticulum, when sufficiently large and filled, can compress the esophagus. Main symptoms are regurgitation of undigested food from the diverticulum and food passage problems, sometimes even resulting in a complete food passage block. Traditionally a Zenker's diverticulum was excised in an external surgical procedure. Nowadays the less traumatic endoscopic approaches are preferred by most surgeons. All endoscopic treatments are directed at transecting the diverticuloesophageal wall so that passage and overflow from the diverticulum into the esophagus is achieved. This transection also implies a myotomy of the UES. In this chapter the results of modern micro-endoscopic CO<sub>2</sub> laser techniques (MEDCO<sub>2</sub>A) and the results of the previously used techniques micro-endoscopic CO<sub>2</sub> laser without acuspot and endoscopic diverticulotomy with electrocautery (MEDCO<sub>2</sub> and EDE) are compared. In the modern MEDCO<sub>2</sub>A 86.7% of the patients no longer had any dysphagia 1 year postoperative and repetitive surgery was required in 13%. The most feared complication mediastinitis was not encountered in MEDCO<sub>2</sub>A. In MEDCO<sub>2</sub> and EDE 78.7% and 72.7% no longer had any dysphagia 1 year postoperative and repeat surgery was required in 19.6% and 24.3%. As was expected the technological progress led to a significant reduction in complication rates and improved results. The results and complication ratio of MEDCO<sub>2</sub>A are comparable to the reported results of the recently introduced endoscopic stapler diverticulotomy, and indicate that CO<sub>2</sub> laser treatment remains an excellent treatment modality.

## CHAPTER 4: EXTERNAL UES-MYOTOMY

Upper esophageal sphincter (UES) myotomy is the most frequently used surgical technique to treat oropharyngeal dysphagia and aspiration. The upper esophageal sphincter (UES) remains tonically contracted between swallows and acts as an additional barrier preventing influx of air during inspiration and protection of the upper airway by refluxate from the esophagus and stomach. Opening of the esophageal inlet to enable passage of the bolus from the pharynx into the esophagus is achieved by a combination of 1) elevation and anterior displacement of the larynx, which assists in the esophageal inlet being pulled open, 2) relaxation of the UES and 3) passive dilatation of the esophageal inlet as a consequence of the propulsion of the bolus being pushed downwards by contraction of the pharyngeal constrictor muscles. Failure of UES relaxation or other forms of cricopharyngeal dysfunction as well as diminished pharyngeal constrictor activity lead to an obstruction of bolus passage and can result in aspiration of food and saliva. Various conditions affect the complex coordinated actions of neuromuscular structures in the hypopharyngeal, laryngeal and UES regions. They can be divided in neurogenic, myogenic, idiopathic or iatrogenic causes. Adaptation of food bolus consistency can be the first step in treating oropharyngeal dysphagia, in more severe cases replacement of oral alimentation by nutrition via a gastrostomy or UES-myotomy can be considered. UES-myotomy consists of sectioning all the muscles that constitute the functional UES unit, and its goal is to facilitate transfer of the bolus from the pharynx into the cervical esophagus. Patients with longstanding dysphagia and/or aspiration problems of different etiologies who underwent UES-myotomy as single surgical treatment were analyzed. Pre- and postoperative manometry and videofluoroscopy were used to assess swallowing and aspiration. Initial and long term results after more than 1 year demonstrated success in 75% of the patients. The best outcomes were observed in patients with dysphagia of unknown origin, non cancer related iatrogenic etiology and neuromuscular disease. All successful patients had full oral intake with a normal bolus consistency without clinically significant aspiration. In contrast to what is stated by some authors, no correlation was found between pre-operative constrictor pharyngeal muscle activity and success rate. It was concluded that in select cases of oropharyngeal dysphagia success may be achieved by UES-myotomy with restoration of oral intake of normal bolus consistency.

## CHAPTER 5: LARYNGEAL SUSPENSION WITH UES-MYOTOMY

In patients with chronic severe aspiration and recurrent pneumonia often a strict percutaneous endoscopic gastrostomy (PEG) feeding policy, a total laryngectomy,

or any other type of permanent anatomical or functional separation of airway and digestive tract, is performed. However in selected cases it is possible to preserve or restore oral intake with a functional larynx by a laryngeal suspension procedure in combination with a UES myotomy. This procedure should be considered if aspiration is caused by a combination of deficient deglutitive laryngeal elevation, lack of pharyngeal constrictor activity, and insufficient opening of the esophageal inlet. By suspending the laryngo-hyoid complex antero-cranially to the mandible the airway is pulled away from the bolus and is partially covered by the epiglottis diverting the bolus around it. The repositioning of the laryngo-hyoid complex also pulls the esophageal inlet open providing better drainage in the esophagus and less chance of aspiration from stasis. Our results demonstrated that in 9 of the 17 patients (59%) long-term full oral intake without aspiration was achieved. In 3 patients (18%) partial improvement of deglutition was achieved, but they remained partly dependent on gastrostomy feeding for adequate nutrition. In 2 patients (12%) aspiration (of saliva) was reduced and no more aspiration pneumonias occurred, but they were unable to achieve even modified oral intake. In 3 patients (18%) finally a total laryngectomy could not be avoided, in 2 after initial success and as a result of progression of neuromuscular disease. None of the patients succumbed to aspiration pneumonia. We concluded that in most of our patients (59%) life-threatening aspiration was successfully treated by UES myotomy and laryngeal suspension with full restoration of oral intake.

## CHAPTER 6: STRICTURES AND FIBROSIS OF THE LARYNX AND PHARYNX

Chemoradiation and primary irradiation are frequently used in patients with squamous cell carcinoma of the head and neck. Post treatment dysphagia and aspiration are frequently seen, and are directly related to both swallowing mechanism disruption as well as stricture formation of the pharynx or esophagus.

### Chapter 6A: CO<sub>2</sub>-laser pharyngoplasty for severe oropharyngeal stenosis

In this chapter we report a case following radiotherapy for a T2 soft palate carcinoma where strictures on several levels developed. First in the nasopharynx, which remained untreated, second in the upper esophagus for which repeated dilatation was performed and third, 4 years after radiotherapy a slow progressive stenosis developed in the oropharynx, where strictures originating from the dorsal and lateral pharyngeal walls were attached to the free edge of the epiglottis on both sides. This patient repeatedly choked on small fragments of solid food and required a Heimlich maneuver when a piece of food obstructed this stenosis. A surgical technique is presented in which these strictures are incised with the CO<sub>2</sub> laser and released from the epiglottis. Mucosal-flaps were cut with the CO<sub>2</sub> laser from the hypopharynx bi-

laterally and were transpositioned and sutured to cover the raw surface of the pharyngeal walls to prevent re-stenosis with the epiglottis. This patient could return to a normal diet and remained free of stenosis during a seven year follow-up

**Chapter 6B: Anterograde-Retrograde rendezvous dilation for complete UES stenosis**

In this chapter an anterograde-retrograde dilatation technique is presented in a case of complete obstruction of the hypopharynx/cervical esophagus following radiotherapy for a T2N0 laryngeal carcinoma. By introducing a guided wire retrograde through a percutaneous gastrostomy the lumen of the esophagus could safely be detected from the hypopharyngeal side without creating a false route in the mediastinum. After restoring the lumen repeated anterograde bougie dilatation provided a patent food way.

**Chapter 6C: Laryngo-tracheal separation with voice prosthesis in dysfunctional larynx**

In patients presenting with strictures and aspiration following (chemo)radiation the larynx can be completely fibrosed consequently impairing the anterosuperior laryngeal elevation as the main deglutitive protective function. In these cases a laryngotracheal (LT) separation procedure can be taken into consideration. In this procedure the larynx is closed by a blind proximal tracheal pouch and for respiration a lower tracheostoma is created. The structural integrity, motor and sensory innervations are preserved. This technique proves to be reliable in patients who will not tolerate many surgical revisions. Secondary tracheotracheal voice-prosthesis placement can provide voice rehabilitation. The channeled air through the voice-prosthesis can also be used in conjunction with vocal fold closure to build subglottic pressure for a cough or clearing of the throat/pouch of accumulated fluid should this interfere with phonation. A case is presented where also a complete stenosis of the esophagus was treated. Finally full oral intake and voice rehabilitation was achieved.

**CHAPTER 7: WHEN NOT TO PERFORM SURGERY**

A case is discussed where dysphagia was caused by Amyotrophic Lateral Sclerosis, a fast progressive neurodegenerative disease. The initial symptoms were laryngospasm and dysphagic complaints. Before performing surgery to alleviate the dysphagic complaints diagnosis of the underlying disease, which proved to be difficult, was needed. When the diagnosis was finally confirmed it was decided that surgery to treat the dysphagia in this rapidly progressive disease would not benefit the patient, who died within months of respiratory insufficiency. This case description was added to this thesis as a demonstration of the type of patient which is not considered suitable for surgical therapy of dysphagia and aspiration, although the clinical

examination demonstrated pathology which theoretically could be alleviated by performance of a laryngeal suspension procedure in combination with UES myotomy. The progressive character of the disease would however not allow for a meaningful increase in the quality of life by such a procedure.

## **CONCLUSION**

Although only a minority of dysphagic patients will be able to benefit from efforts towards surgical treatment, the results presented in this thesis show that it is worthwhile to take into consideration the several procedures which have been described, in order to optimize the quality of life of the dysphagic patient.