



LUDWIG'S ANGINA: A CASE SERIES OF SEVEN CASES AND REVIEW OF AIRWAY MANAGEMENT PROTOCOLS

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ABSTRACT

Ludwig's angina is a potential life threatening rapidly progressive submaxillary, submandibular and sublingual cellulitis of the floor of the mouth. Aggressive management of the airway is critical to avoid untoward morbidity. A Case studies was undertaken in Rajarajeswari Medical college, Bangalore between March 2019 and February 2020. Patients referred to our tertiary centre with features suggestive of Ludwig's angina were selected. All patients in this study were subjected to radiological confirmation of submandibular space cellulitis or abscess for inclusion. This assessment compromised of both extents of the infective pathology and patency of the upper airway by USG OR CT Neck. Four of the cases were subjected to surgical management. Among the 7 patients 4 were females and 3 were males with mean age of 46 ± 13.2 years. Of the 7 patients 6 had a history of tooth extraction within the past week prior to admission and 1 had sialadenitis 10 days prior to admission. Two (29%) of the patients were diabetic, 1 (14.28%) patient was both hypothyroid and diabetic, 1 (14%) patient had microcytic hypochromic anaemia, 1 (14.28%) patient was hypothyroid and 2 (28.57%) of the patients were weakly VDRL positive. .operated cases 57 % underwent a tracheostomy prior to incision and drainage due to airway compromise. Of the remaining 43% 1 of the patients was intubated followed by incision and drainage, the 2 were managed conservatively. The delayed presentation of Ludwig's angina to an otorhinolaryngology clinic results in an unpredictable natural disease process. Rapid progression of the sublingual cellulitis requires timely management of the airway.

KEYWORDS : ludwig's angina, submandibular space, tracheostomy

INTRODUCTION

The term Ludwig's angina was coined by the German surgeon Karl Friedrich Wilhelm von Ludwig in 1836 as a potential life threatening rapidly progressive submaxillary, submandibular and sublingual cellulitis of the floor of the mouth.¹ Dental pathology, predominantly of the lower molar's accounts for the majority of Ludwig's angina cases. Peri tonsillar abscesses, parapharyngeal space infections, submandibular gland sialadenitis and dental trauma constitute to a smaller percentage of cases infecting the submandibular space. Chronic conditions have been reported to predisposing patients to neck space infections. Neck space abscesses are more often found in individuals with diabetes mellitus, malnutrition, alcoholism or an immunocompromised state²

Over the course of the last decade the incidence of Ludwig's angina has dramatically reduced with the increased availability and use of antibiotics. The mortality of the patients with Ludwig's angina has declined from 50% to less than 10% with the adjuvant of antibiotics.³ Faster resolution of sublingual cellulitis has resulted in fewer patients requiring airway protection.

Untreated conditions predisposing to Ludwig's angina can result in progressive cellulitis leading to trismus, posterior displacement of the tongue, pooling of secretions and progressive swelling of the oropharyngeal tissues, eventually leading to airway compromise⁴.

Ludwig's angina still is associated with a 10% mortality rate³. Due to rapid progression of airway obstruction, Ludwig's angina patients present with, immediate airway management is critical. With the introduction of fiberoptic and Glidscope laryngoscopic intubations the non-surgical airway management has been made more flexible but to date awake tracheostomy is the gold standard in surgical airway management of Ludwig's angina⁵.

This paper evaluates the radiological assessment of the airway prior to further management of a submandibular space infection. With advancements in technology the accuracy, access and utilization of radiology in diagnosis has transitioned. In Ludwig's angina radiology can provide us with an initial assessment of the extent of the airway compromise and avoid precipitating airway irritation or sudden airway loss with invasive diagnostic procedure. A radiological assessment provides the extent of the disease process as well as indicate the possible need for a tracheostomy.

Case Series

A total of 7 such patients were included in the study. There were four female and three male patients. The youngest patient was a 30-year-old female and the oldest was a 63-year-old male with an average age of 46 ± 13.2 years.

Of the 7 patients 6 had a history of tooth extraction within the past week prior to admission and 1 had sialadenitis 10 days prior to admission. Two (29%) of the patients were diabetic, 1 (14.28%) patient was both hypothyroid and diabetic, 1 (14%) patient had microcytic hypochromic anaemia, 1 (14.28%) patient was hypothyroid and 2 (28.57%) of the patients were weakly VDRL positive.

Four patients underwent tracheostomy and I&D under local anaesthesia, 1 underwent I&D under general anaesthesia and 2 other patients were managed conservatively.

The assessment of the airway was done using three parameters. These included the presence of stridor and oxygen saturation, the grading of trismus (Clinical classification system for the surgical management of trismus)⁶ and a radiological assessment of the airway.

Contrast enhanced computed tomography was done in four patients, this included all patients presenting with stridor for a detailed assessment of the airway and surround neck spaces to evaluate the extent of the disease process. Three patients only underwent assessment with an ultrasound. Four (57.14%) patients with stridor were subjected to computed tomography following ultrasonography and were identified to have upper airway compromise radiologically.

Table 1. Airway
Table 1 showing subjects with description of Trismus, Stridor, Airway on CT and USG of Neck.

Patient	Trismus	Stridor	Airway on CT	USG neck
Female/ 38y	3	Developed on day 2 of admission	Upper airway compromise present	Irregular collection in the intermuscular plane, sub mandibular region with extension into the parotid region, masseteric space, sublingual space on the left side and subcutaneous oedema.

Female/ 35y	4	Biphasic stridor	Upper airway compromise present	Irregular collection in submuscular plain medial to angle of the mandible on the right side with extensions into the submental and submandibular region with air pockets in the subcutaneous region.
Male/ 40y	2	NO	-	Irregular collection in the Submental and submandibular region on the right side with subcutaneous oedema.
Female/ 32y	1	NO	-	Right submandibular gland sialadenitis with an irregular collection in the submuscular plane of the submandibular and sublingual region.
Male/ 45y	1	NO	-	Irregular collection in the Submental and submandibular region on the left side with subcutaneous oedema.
Male/ 63y	4	Biphasic stridor	Upper airway compromise present	Irregular collection in the intermuscular plane, sub mandibular region with extension into the masseteric space, sublingual space on the left side and subcutaneous oedema.
Female/ 30y	4	Biphasic stridor	Upper airway compromise present	Irregular collection in the Submental and submandibular region on the right side with subcutaneous oedema.

Pre-operative pictures of subjects:



Picture1: Pre-operative picture of 45 year male who was managed conservatively



Picture 2: Preoperative Picture Of 63 Year Male Who Presented With Stridor.



Picture 3: Pre-operative picture of 35 year female with trismus and stridor.

Table 2. Management

Patient	Management	Ryle's tube	Decannulation
Subject 1	Tracheostomy and I & D	Removed on 4 th day post op	10th day
Subject 2	Tracheostomy and I & D	Removed on 4 th day post op	7th day
Subject 3	I & D	-	
Subject 4	Conservative	-	
Subject 5	Conservative	-	
Subject 6	Tracheostomy and I & D	Removed on 4 th day post op	7th day
Subject 7	Tracheostomy and I & D	Removed on 4 th day post op	10th day

Table 2: Description of management of subjects and decannulation, Conservative management included antibiotics with glycaemic monitoring.

Four patients who were confirmed to have a compromised upper airway radiologically were taken up for surgical airway management with an awake tracheostomy followed by incision and drainage under local anaesthesia.

Tracheostomy tube care and daily dressing were done for the patients during their course of hospital stay.

Out of three patients who did not have airway compromise two were managed conservatively with only one of these patients' requiring incision and drainage under general anaesthesia. None of the conservatively managed patients required I&D. All the patients were treated with intravenous antibiotic coverage for 5 days with injection ceftriaxone, metronidazole and injection amikacin. Appropriate management of the associated comorbidities and supportive treatment was provided for the patients during their hospital stay.

All the patient's pus was sent for culture and sensitivity after the incision and drainage. None of the samples showed growth in any of the patients. All the patients were noted to have been treated with antibiotics prior to arrival in the tertiary care centre.

Negative cultures were attributed to unrecorded prior antibiotic use. The presence of anaerobes may be underestimated because of difficulty in their culture.

DISCUSSION

Ludwig's angina can be a lethal condition. Timely diagnosis and treatment are imperative in decreasing morbidity. When patients present to us in progressive disease the assessment of the airway and its immediate management is imperative in reducing the mortality and morbidity in Ludwig's angina. With no standardised criteria for diagnosis or management of the acute airway obstruction, the treatment protocols vary widely from institution to institution depending on the availability of resources and expertise.

As per Tripathy M et al, Ludwig's angina was found to be more prevalent between age group of 41 to 70 years with a mean age group of (60.3yrs). Males were found to be more commonly affected (71%) as compared to females (29%). Odontogenic infections still accounted for majority (81%) of causes with uncontrolled type 2 diabetes mellitus emerging as the main associated comorbidity. Patients mainly presented with symptoms like submental and submandibular swelling (100%), dysphagia (67%), odynophagia (55%), and stridor (42%)⁷.

This case series similarly comprised of patients with age ranging from 30 to 63 years, with 6 of the 7 patients having history of prior

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