

## Case Series

## CERVICOTOMY VS. THORACOTOMY: A CASE SERIES OF MANAGEMENT OF DESCENDING NECROTIZING MEDIASTINITIS

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### ABSTRACT

*Descending necrotizing mediastinitis is an inflammatory condition of the connective tissue involving cervical region and mediastinal structures. This is a very serious condition although the mortality rate has been decreased over the past years due to prompt diagnosis. We present a case series of 6 patients. It is concluded from the study that the underlying knowledge of oral hygiene in our respondents was lacking in both genders. Girls were found to have a more positive attitude towards tooth brushing and dental flossing, though the actual practice of dental flossing was disappointingly low in both genders. Girls were also keener on brushing their teeth at least twice a day and preferred using circular motions of the brush.*

### INTRODUCTION

Mediastinitis can be defined as an inflammation of the connective tissue that involves mediastinal structures. It can be acute or chronic. Depending on the etiology, it can be secondary to infectious or non-infectious causes<sup>1,2</sup>. When the condition has an infectious origin located in the cervical or oral region, the mediastinal inflammation is termed as descending necrotizing mediastinitis (DNM). This is a very serious disease having a mortality rate ranging between 25% and 50%<sup>1</sup>. The mortality rate has declined considerably due to prompt diagnosis and contrast and aggressive surgical intervention. Despite various surgical approaches for the treatment of DNM, the optimal approach still remains controversial, posterolateral thoracotomy is described as a standard approach by some authors<sup>3,4,5</sup> while some authors are more inclined towards a more conservative approach such as cervicotomy and transcervical drainage<sup>6,7</sup>. We present a case series of six patients who presented in Rehman Medical Institute (RMI), Peshawar in the year 2012 with mediastinitis and would like to share our experience in the management of DNM.

### CASE 1

A 60 year old man presented to the ER department of RMI in October 2012 with bilateral swelling in submandibular region which were drained in Afghanistan via a high neck incision at the lower border of the mandible

Patient was pyrexemic and his WBC was  $22.40 \times 10^9/l$ , Pus swab was taken for culture and sensitivity, broad spectrum antibiotics were started and contrast CT Head, Neck and Chest was performed. CT showed extensive air pockets in the neck soft tissues extending inferiorly into mediastinum till the level of carina. There were multiple tiny fluid filled pockets in the mediastinum; mild bilateral pleural effusion was also seen. On the basis of clinical examination and Radiological findings a diagnosis of Descending Necrotizing Mediastinitis (DNM) was made and the patient was shifted to ICU for cardiac and respiratory monitoring. A referral was made to the cardio thoracic surgical team and the patient was shifted to the operating theater. A bilateral lower neck incision was made at the anterior border of sternocleidomastoid, pus was drained bilaterally. Extensions of the pus tracts were identified which were going into the upper mediastinum, they were explored and the neck and mediastinum was washed thoroughly with betadine and saline. Corrugated drains were placed in the neck. The cardio thoracic team then placed a chest tube on the right side of the chest which drained about 300cc of turbid pus containing fluid. The patient was shifted to

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surgical ICU for monitoring where he was on ventilatory support. Pus was drained/ sucked out via suction machine periodically every day from the mediastinum. The Microbiology for the pus swab yielded a growth of *Pseudomonas aeruginosa* and *Klebsiella oxytoca* (Extended Spectrum Beta Lactamase - ESBL) which were sensitive to sulbactam which was given to the patient via IV line. As the condition of the patient was improving he was shifted back to the general ward after spending five days in the surgical ICU.

### **CASE 2**

A 27 year old man presented to the ER department of RMI in November 2012 with right sided submandibular swelling which was drained in Afghanistan via a high neck incision below the chin

On arrival his WBC count was about  $18.71 \times 10^9/l$ , he had difficulty in breathing with pus draining from the mouth. He was also pyrexia. The patient was given IV antibiotics and contrast CT Head, Neck and Chest was performed which showed numerous air pockets all around the neck anteriorly and posteriorly. Air and fluid were also seen extending in the chest till sub carina level. There was also evidence of mild atelectasis in inferior lingual and right middle lobe. On the basis of Clinical and Radiological findings the patient was diagnosed with Descending Necrotizing Mediastinitis (DNM). A referral to the cardio thoracic surgery team was made and the patient was shifted to the operating theater. Lower right 1<sup>st</sup> and 2<sup>nd</sup> molars were extracted and bilateral incisions were made at the anterior border of sternocleidomastoid which lead to bilateral drainage of the pus. Pus swab was taken for culture and sensitivity. Extensions of the pus tracts were identified which were going into the upper mediastinum, they were explored and the neck and mediastinum was washed thoroughly with Betadine and saline. Corrugated drains were placed in the neck. The patient was shifted to Surgical ICU for monitoring. Pus was drained/ sucked out via suction machine periodically every day from the mediastinum. The Microbiology for the pus swab yielded a growth of *Pseudomonas aeruginosa* and *Escheria coli* (Extended Spectrum Beta Lactamase - ESBL) which were sensitive to Amikacin which was given to the patient via IV line. As the condition of the patient was improving he was shifted back to the general ward after spending seven days in the surgical ICU.

### **CASE 3**

A 55 year old female who was a known diabetic and hypertensive presented to the ER Department with fever, and right side neck swelling in November 2011.

On arrival the patient had a toxic appearance with a raised WBC count of  $16.51 \times 10^9/l$ , Random blood sugar 301mg/dl, urea 250mg/dl, serum creatinine 2.1mg/dl, patient was slightly hypokalemic. The patient was sent to radiology department for CT head, neck and chest which showed marked subcutaneous swelling on right side of the mandible along with diffuse edematous changes and pockets of air and fluid involving prevertebral and para pharyngeal region bilaterally with resultant narrowing of the air column. The inflammation extended up till superior mediastinum. On the basis of Clinical and Radiological findings the patient was labeled as suffering from Descending Necrotizing Mediastinitis (DNM). The patient was shifted to the operating theater where 1st and 2nd right lower molars were extracted and bilateral submandibular incisions were given and pus was drained, it was noted that more pus was drained from the right sub mandibular region and there was almost no pus from the opposing side. The neck and mediastinum were washed thoroughly with betadine and saline. Corrugated drains were placed in the neck. The patient was shifted to Surgical ICU for monitoring. Pus was drained/ sucked out via suction machine periodically every day from the mediastinum.

### **CASE 4**

A 31 year old male patient was admitted in the Surgical ICU of RMI on 1/9/2012. He presented with shortness of breath, productive cough, pyrexia, abdominal pain and diffuses neck swelling. His history revealed that he was suffering from peri tonsillar abscess which was drained three times previously before reporting to RMI. An X-ray chest was arranged which showed pyo pneumothorax left side of the chest, a swab sample of the pus was taken and was sent to microbiology for culture and sensitivity which showed bacteria *Streptococcus pyogenes*, Broad spectrum antibiotics were started and a chest drain was inserted under LA which aided in the drainage of pus. His WBC count was  $24.08 \times 10^9/l$  at this stage, as the condition of the patient failed to improve a Contrast CT neck and chest was arranged which showed Mediastinal emphysema at superior and posterior mediastinal

levels along with hydro pneumothorax of left lung . The patient was rushed to the operation room where the cardiothoracic team performed decortication of left lung and left sided posterio lateral thoracotomy. Pus from the mediastinal space was drained and then cleaned thoroughly with betadine and saline, two drains were placed in the chest to aid in pus drainage, the patient was sent back to Surgical ICU for cardiac and respiratory monitoring where his Vitals slowly started deteriorating. The patient went into cardio pulmonary arrest, CPR and defibrillation was done but the patient failed to respond and expired

### **CASE 5**

A 36 year old afghan male patient reported to the OPD of RMI complaining of pain and swelling in the left mandibular region and inability to open his mouth. On detailed examination the patient had a large swelling in his submandibular region, decreased breath sounds over the base of the left lung were also noted. Lab investigations revealed raised urea (121 mg/dl) and creatinine (2.9 mg/dl) . A CT neck and chest was done which revealed soft tissue swelling extending deep into Para pharyngeal and pre vertebral region resulting in marked asymmetry and narrowing of the pharynx. Emphysema was noted along the carotid sheath leading to marked left mediastinal emphysema. Extensive hydro pneumothorax was seen on the base of the left lung corresponding with collapse and consolidation of left lung lower lobe. The patient was shifted to the operating room where a postero lateral thoracotomy was done, the mediastinal cavity was opened, multi loculated abscesses were drained, visceral decortication was done, the cavity was thoroughly washed with betadine and saline and two chest drains were placed. The post-operative course was uneventful and the patient was discharged in a stable condition.

### **CASE 6**

A 27 year old Afghani male was admitted in the Surgical ICU via ER with a discharging wound in the right submandibular region. He also complained of shortness of breath and productive cough. A few days back he had undergone a dental extraction in his home town by a local dentist after which he developed neck swelling which was also drained locally. He was admitted in the Surgical ICU for cardio pulmonary monitoring, broad spectrum antibiotics and I/V fluids were started and an emergency CT neck and chest was

arranged which showed edema, emphysema which was extending till the level of anterior, middle and posterior mediastinum up till the level of carina. Bilateral plural fluid collection was also noted, a diagnosis of DNM was made and the cardio thoracic team was involved in the management of the patient. The patient was shifted to the operating room where a posterio lateral thoracotomy with decortication was done on the right side, during surgery the patient went into hypoxic cardiac arrest but was recovered successfully. Pus was drained; mediastinum and chest were thoroughly washed with Betadine and saline. Two chest tubes were placed and the chest was closed while the neck remained open. The patient was shifted back to Surgical ICU for cardio pulmonary monitoring. Overnight the patient went into cardio pulmonary arrest, CPR and defibrillation was done but the patient failed to respond and expired.

### **DISCUSSION**

The first case of mediastinitis from oro pharyngeal region was reported by Pearse in 1938<sup>8</sup> who termed it as “Descending Necrotizing Mediastinitis” . Based on radiological findings in 1999 Endo et al<sup>9</sup> suggested a new classification of DNM. In Type I (focal type), the infection is restricted to the superior mediastinal space above the tracheal bifurcation. Type II (diffuse type), is divided into two subtypes. In subtype IIa, infection is still located in the inferior anterior mediastinum; in subtype IIb, the infectious process has already reached the inferior posterior mediastinum.

Early diagnosis of DNM is very important to prevent morbidity and mortality. In 1983 Estrera et al<sup>10</sup>. formulated a criteria for diagnosis of DNM which is still valid today, The Estrera criteria are as follows<sup>1</sup>. Evidence of oropharyngeal infection<sup>2</sup>. Radiographic characteristics of mediastinitis<sup>3</sup>. Intraoperative or post-mortem documentation of infection<sup>4</sup>. Establishment of a relationship between the oropharyngeal process and mediastinitis

The main finding from chest X-ray is pneumomediastinum with an air-fluid level, which is best viewed in lateral projection. However Plain Chest X-ray may be misleading in the diagnosis of DNM, therefore CT scans are better and most commonly used for the diagnosis of DNM. CT scans make it possible to assess the spread of the infection and decide on the best surgical approach. CT scans is useful for monitoring outcomes following surgery, and should always be repeated if there is any sign of clinical deterioration. Magnetic

resonance imaging (MRI) has poor use in diagnosing mediastinitis, except in cases when the first two tests (CT scan and chest X-ray) still leave doubts regarding the patient's condition. Cultures with Gram staining are also definitive diagnostic procedures<sup>11</sup>.

The major Signs for development of mediastinitis are deep cervical infection with swelling, erythema, tenderness, crepitation and fever

However the major Symptoms commonly observed in patient of DNM are sub-sternal and pleuritic pain, dysphagia, dyspnea, plural / pericardial effusion and septic shock.

DNM is typically a result of mixed aerobic and anaerobic bacterial infections. The most commonly isolated bacteria is beta-hemolytic oral<sup>12,13</sup>. Other organisms commonly found include Prevotella, Peptostreptococcus, Fusobacterium, Veillonella, Actinomyces, Bacterioides, Staphylococcus and also alpha-hemolytic Streptococcus. Pathological states that lower tissue oxygenation (diabetes or immunodeficiency) favors the spread of infection caused by anaerobic organisms<sup>14</sup>. The tissue destruction is explained by multiple small-vessel thrombosis that cause hypoxia and extensive edema which becomes clinically evident within 24-78 hours after onset of deep cervical infection. Streptococcus and Gram-negatives anaerobes produce enzymes (fibrinolysin, coagulase, hyaluronidase and collagenases) that mainly cause tissue destruction and help in spread of infection through facial spaces.

The deep neck is divided into three major facial pathways which are pretracheal space, lateropharyngeal space and retro pharyngeal space. About 70% of the cases of DNM occur through the retropharyngeal pathway and 8% occur via the pretracheal route<sup>15</sup>. Negative pressure in the mediastinum combined with gravity, and respiration further aids the pus to reach the mediastinum. Gram-negative bacilli can cause tissue lesion by gas release<sup>16</sup>.

As far as surgical management is concerned there are four major principles in treatment of DNM which are as follows

1. Aggressive cervical and Mediastinal debridement and drainage
2. Effective Pleural/ Pericardial drainage
3. Broad spectrum antibiotics
4. Support of critical organs in ICU

There are four surgical approaches for drainage of cervical and mediastinal spaces

- Cervicotmy
- Posteriolateral Thoracotomy
- Median Sternotomy
- Trans thoracic drainage

Despite various surgical approaches for the treatment of DNM, the optimal approach still remains controversial, posterolateral thoracotomy is described as a standard approach by some authors<sup>3,4,5</sup> while some authors are more inclined towards a more conservative approach such as cervicotomy and transcervical drainage<sup>6</sup>. Estra et al<sup>10</sup> questioned the adequacy of trans cervical drainage he suggested thoracic drainage in cases where necrosis had spread below the tracheal bifurcation. Marty-Anne et al<sup>5</sup> suggested thoracic drainage irrespective of the level of mediastinal involvement. Corsten et al<sup>17</sup> were the first to identify a statistically significant difference in survival in a subsequent meta-analysis, between patients undergoing only transcervical mediastinal drainage (53%) and those receiving transthoracic mediastinal debridement (81%).

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