Is Prophylactic Antibiotic Use Beneficial in Thoracostomy Tube Placement?

Dr. Robert Davis, Dr. Mikhail Joutovsky, Dr. Ernest Zichal, Dr. Rahkesh Guttkonda, Medical Student Ukanma Bassey
St. Barnabas Hospital Department of Surgery

Introduction

The role of pre-procedural/pre-operative antibiotics as a prophylactic in elective and urgent cases has shown to be beneficial in reducing the risk of postoperative complications in many studies. However, their benefit in traumatic surgery is still relatively unknown because the injury has already occurred and the role is more a presumptive therapy, not truly prophylactic. There has been increasing evidence that the “presumptive” therapy helps to reduce the post-procedural/post-operative complications.

In the role of patients needing tube thoracostomy the primary role of prophylactic antibiotics is to reduce the risk empyema and its associated morbidity. The overall rate of empyema following tube thoracostomy ranges from 0 to 18%. In addition, does the prophylactic/presumptive antibiotic therapy help reduce the risk of pneumonia. There has been increasing evidence to support this therapy, that even the Eastern Association for the Surgery of Trauma (EAST) has given a guideline that supports the use of prophylactic antibiotics to reduce the risk of pneumonia only. There is no supportive evidence that it decreases the risk of empyema and/or thoracic surgery.

Methods

First an online search using MEDLINE using the subject words of antibiotic prophylaxis; chest tubes; human: drainage; tube thoracostomy; infection; empyema; and bacterial infection-prevention and control from the years 1997 to Current. A total of three articles were found and reviewed. In addition, there was review of the Eastern Association for the Surgery of Trauma (EAST) Guidelines which reviewed studies from 1977 to 1997 and reviewed eleven articles. Using our Trauma Database a list of all patients, including blunt and penetrating trauma, receiving chest thoracostomy placement between 2001 and 2007 was compiled for a retrospective analysis. From this list, patients were excluded if they suffered more than isolated chest injuries. A total of 76 patients were left and then a chart review of the patients occurred looking at the number of patients that had complications of pneumonia and empyema leading to thoracic surgery.

Results

<table>
<thead>
<tr>
<th>Results Continued</th>
</tr>
</thead>
<tbody>
<tr>
<td> </td>
</tr>
<tr>
<td>No Antibiotics</td>
</tr>
<tr>
<td>More than 1 day of Antibiotics</td>
</tr>
</tbody>
</table>

In our second analysis, the second group and third group using the complications rates were compared. Of the 19 patients receiving 1 day of antibiotics, two developed complications, of the 22 patients receiving antibiotics for more than 1 day, three developed complications for an Odds Ratio of 0.75 and a Fisher test score of 0.57.

In our third analysis, patients were divided into those that had received antibiotics versus those that did not and requiring thoracic surgery. Of the 35 patients not receiving antibiotics, one patient later required thoracic surgery. Of the 41 patients receiving antibiotics, two patients later required thoracic surgery for an Odds Ratio of 0.57 and a Fisher test score of 0.56.

In our fourth analysis, patients were divided into those that had received antibiotics versus those that did not and developing pneumonia. Of the 34 patients not receiving antibiotics, 5 patients later developed Pneumonia. Of the 39 patients receiving antibiotics, 3 patients later developed pneumonia for an odds ratio of 2.07 and a Fisher test score of 0.28.

Conclusions

Our research yields that there is no statistical difference between the rate of pneumonia or empyema leading to thoracostomy by giving prophylactic antibiotics or continual antibiotics throughout the placement of the tube thoracostomy. This may show a variance from the EAST trauma guidelines that prophylactic antibiotics help reduce the risk of pneumonia but not empyema. Our small sample size may be the reason for no variance to the EAST trauma guidelines and a continued study may be of some use with the same parameters. There was a study by Maxwell, et al. that shows similar results to ours. In conclusion they found that empyema occurred more frequently in penetrating trauma and pneumonia in blunt trauma but the overall incidence of prophylactic antibiotics didn’t reduce either risk. In contrast, studies by Sanabria, et al and Gonzalez and Halevar show there is a reduced risk of lung infections by giving prophylactic antibiotics.

Further clinical research is required to test the validity of prophylactic antibiotics in tube thoracostomy. The best research designs are double-blinded and multi-institutional, which is difficult to obtain in this setting secondary to the placement being in an emergent setting. In addition, looking at the exact timing of administration versus the timing of insertion of tube. To further understand our current research data separating blunt versus penetrating trauma could yield some beneficial data. Other studies could look at the benefits of chest physiotherapy and the continued proper care of chest tubes involving possible continual antibiotic use and frequency of dressing changes.

Bibliography