Int.J.Curr.Microbiol.App.Sci (2016) *5*(8): 75-80

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 5 Number 8 (2016) pp. 75-80**
Journal homepage: http://www.ijcmas.com

Case Study

http://dx.doi.org/10.20546/ijcmas.2016.508.009

Escherichia coli in Pleural Empyema – An Uncommon Isolation

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Keywords

Escherichia coli, Pleural Empyema cholecysitis, bacteremia, meningitis.

Article Info

Accepted:
06 July 2016
Available Online:
10 August 2016

A B S T R A C T

Escherichia coli is the most frequent causative agent isolated in purulent infections, urinary tract infections, cholecysitis, bacteremia, meningitis and in traveler`s diarrhoea. Isolation of *Escherichia coli* from pleural space is uncommon. In this report, we present a case of *Escherichia coli* causing pleural empyema. *E.coli* may cause severe illness requiring more aggressive treatment such as appropriate antibiotic and decortication. Thus, diagnostic thoracentesis should be carried out in any patient who presents with fever, pleuritic pain or unexplained signs with hydrothorax. This paves a way for proper antibiotic to be given, to avoid prolongation of illness and to prevent the emergence of resistant strains.

Introduction

Pleural empyema is the collection of purulent fluid in the pleural space. The incidence of pneumonia has decreased in the recent years due to antibiotic usage. However, the incidence of pleural infections is increasing worldwide (Burgos *et al*., 2013). Pleural infections are most commonly caused by Gram positive cocci, anaerobic bacteria and tuberculous infection. *Escherichia coli* is the most frequent causative agent isolated in purulent infections, urinary tract infections, cholecysitis, bacteremia, meningitis and in traveler`s diarrhoea. Isolation of *Escherichia coli* from pleural space is uncommon.

In this report, we present a case of *Escherichia coli* causing pleural empyema.

Case Definition

Thoracic empyema is defined as pleural effusion that fulfilled at least one of the following criteria:

1.The presence of frank pus on pleural aspiration
2. Presence of organism on culture
3. Positive pleural fluid Gram stain

Case Description

A 20 years old male, admitted with

complaints of pain in the right side of abdomen for three days and high grade fever for one day. The patient was provisionally diagnosed as right ureteric colic and was started on ciprofloxacin 500mg i.v bd, analgesics and fluid supplements. Routine investigations was done (Table1).

Patient had not shown any response to treatment and the antibiotic was switched over to Cefotaxime i.v 500mg bd. After seven days of treatment, he had intermittent abdominal pain and high grade fever and was shifted to IMCU and was started on metronidazole 500mg i.v bd. Imaging modalities of investigation were done (Table 2). Pleural fluid tapping was done under aseptic precautions and sent to microbiology department for culture and sensitivity.

On direct Gram staining, numerous pus cells with abundant gram negative bacilli were seen (Figure 3). On Ziehl Neelsen staining, no acid fast bacilli was seen. Conventional culture showed *Escherichia coli* which was confirmed by its colony morphology, motility test and biochemical reactions. The antibiotic susceptibility testing showed resistance to first line drugs. ESBL was confirmed by Double disk method according to CLSI guidelines.

The isolate was sensitive to Meropenam. Hence it was diagnosed as a case of acute viral fever with polyserositis complicated by ESBL producing *Escherichia coli* causing pleural empyema.

Results and Discussion

Pleural empyema is a serious complication of pneumonia or infection of adjacent sites that resolves only by appropriate antibiotic or by drainage or by decortication. The incidence of pleural empyema has increased worldwide. In a study conducted in the United States, where the frequency was 3.96 cases per 100000 in 1996 has been increased to 8.10 cases per 100000 in 2008 (Bryant *et al*., 1996).

The microbiological profile of pleural infections vary depends upon the source of infection, host factors and environment. Immuno-compromised persons are more prone for fungal and Gram negative aerobic infections.

In healthy adults, the most common etiological agents are Streptococcus pneumoniae, S.pyogenes and *Staphylococcus aureus* and *Klebsiella pneumonia* (Brims *et al*., 2010). *Escherichia coli* causing pleural empyema is rare in healthy adults. Bacteria in the empyema release β-lactamase capable of degrading β-lactam antibiotics and are relatively unresponsive to antibiotics.

Previous study conducted by Nick A Maskell *et al*., showed that approximately 50% of community-acquired infections were streptococcal, and 20% by anaerobic bacteria.

Hospital-acquired infections accounted for 60% which included bacteria frequently resistant to antibiotics. Mortality rate was also increased in hospital-acquired infections (Nick *et al*., 2006). In our case report, we have presented a healthy adult, with no risk factors for developing empyema was diagnosed with ESBL producing *Escherichia coli* causing pleural empyema. It is a very uncommon isolation when compared with data in various studies (Kundu *et al*., 2010).

Table.1 Baseline investigation report	
Hemoglobin	10 gms%
Total WBC count	12,200 cells/cu.mm
Polymorphonuclear cells	65%
Lymphocytes	32%
Eosinophils	03%
Total protein	7g/dl
Serum albumin	3.8 g/dl
Random blood sugar	89mg/dl
Serum creatinine	0.6mg/dl
Blood urea	27mg/dl
Serum bilirubin	1.1mg/dl
SGOT	16U/L
SGPT	19U/L
ALP	68U/L

Table.2 Imaging Reports	
Ultrasound - abdomen and pelvis	Free fluid in the peritoneal cavity; Appendix appear inflamed with multiple mesenteric lymphadenopathy
Chest Xray – PA view	Right sided pleural effusion (Figure 1)
CT - abdomen and pelvis	Ascites with right pleural effusion with mesenteric adenopathy (Figure 2)

Fig.1 Chest X Ray showing Right sided Pleural effusion

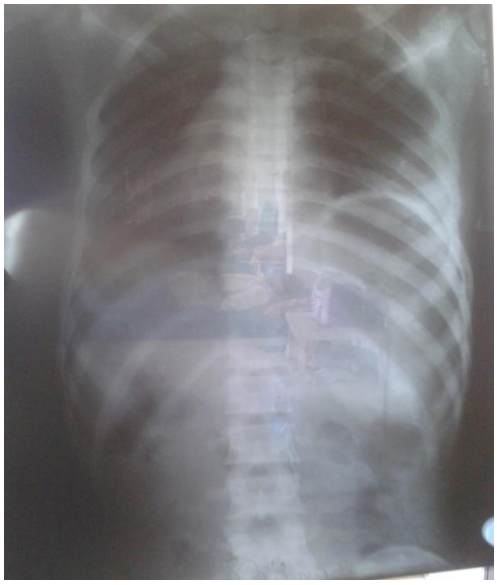


Fig.2 CT Abdomen & Pelvis - Ascites with right pleural effusion with mesenteric adenopathy.

Fig.3 Direct Gram staining, numerous pus cells with abundant gram negative bacilli were seen

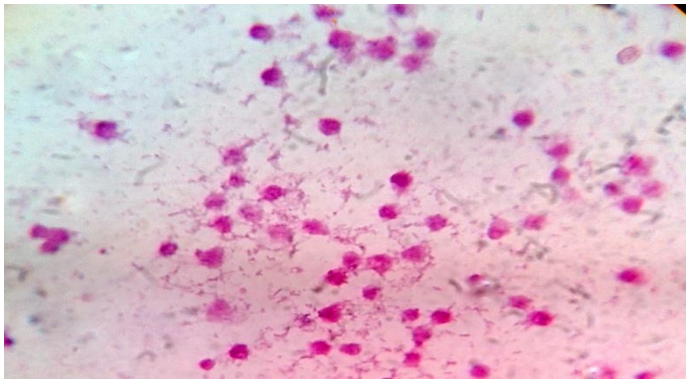


Fig.4 Antimicrobial Susceptibility test of the isolate

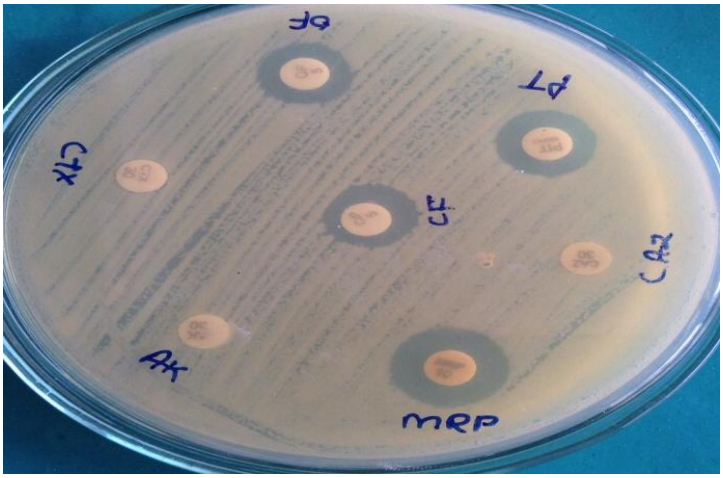
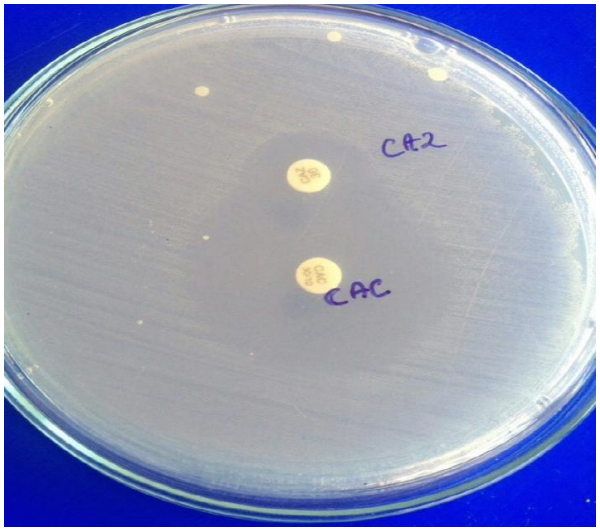


Fig.5 ESBL detection by double disk method



In conclusion, the vicious cycle of poor presenting symptoms and signs, delayed diagnosis and inappropriate antibiotic therapy adversely affects the prognosis of the patient in pleural infections. Hence it is advisory to do early diagnostic thoracentesis in all pleural fluid collections with an appropriate protocol to avoid delay in the diagnosis, treatment and to prevent the evolution of resistant strains.

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How to cite this article:

Malathi Murugesan, Vijayalakshmi Arumugam and Nithya Gomatheswari. 2016. *Escherichia coli* in Pleural Empyema – An Uncommon Isolation. *Int.J.Curr.Microbiol.App.Sci.* 5(8): 75-79. doi: http://dx.doi.org/10.20546/ijcmas.2016.508.009