

**A CASE REPORT**  
**MULTIFOCAL PULMONARY AND LIVER**  
**ABSCESSSES DUE TO *KLEBSIELLA PNEUMONIAE***  
**INFECTION IN A LAMB IN SIDI-BARRANI CITY,**  
**MATROUH GOVERNORATE, EGYPT**

**Wassif, Islam M.\* and Adel M. El-Kattan**

Department of Animal Health, Desert Research Center, Cairo, Egypt

\*E-mail: islam\_wassif@hotmail.com

Lambs mortality was noticed in Sidi-Barrani City, Matrouh Governorate, Egypt during winter season, 2014 - 2015. One of them, a three-month-old female lamb died after signs of fever accompanied with some respiratory manifestations firstly and dullness, inability to move and weight loss for over seven days later, without response to tetracycline treatment. Necropsy revealed multifocal caseous abscesses in the lungs and liver. *Klebsiella pneumoniae* was isolated from these lesions. The bacterial isolate was resistant to Tetracyclin (*in vitro*), which is the most common used antimicrobial agent for animal treatment in this region. On the other hand, it was susceptible to Gentamycin and Chloramphenicol.

**Keywords:** *Klebsiella pneumoniae*, lamb, lung, liver, abscesses

*Klebsiella pneumoniae* is enteric gram-negative bacillus (Abbott, 1999), that is considered as an opportunistic bacteria, which rarely causes enteric disease in domestic animals. *Klebsiella pneumoniae* has ability to circumvent host defense mechanisms, to colonize it and survives in affected organs as it produces abundant capsular material, which may inhibit phagocytosis (Quinn et al., 1994). Lung abscesses are common in sheep, but are difficult to diagnose it only by clinical examination of diseased animal. Sheep with lung abscesses generally show poor body conditions, and are often dull and depressed (Abubakr et al., 1981). Pyogenic infection in sheep is a serious health problem, and can even cause death of the affected animal (Addo and Dennis, 1977). Pneumonia with pulmonary abscesses caused by *Pasteurella multocida*, and *Staphylococcus aureus*, as well as *Trueperella pyogenes* (formerly *Arcanobacterium pyogenes*), *Corynebacterium pseudotuberculosis*, and *Klebsiella pneumoniae* have been reported in sheep (Anderson et al., 2002 and Azizi et al., 2013). Also, *Klebsiella pneumoniae* was isolated primarily from liver abscess in human cases with generalized metastatic complications (Fang et al., 2004).

## MATERIALS AND METHODS

### 1. Case History

In Sidi-Barrani City, Matrouh Governorate, Egypt, which is about 95 km east of the border with Libya (31°36'39"N 25°55'32"E), as a village is mainly a Bedouin community. Winter, 2014-2015, a three-month-old female lamb died after signs of fever accompanied with respiratory manifestations firstly and dullness, inability to move and weight loss for over 7 days later without response to tetracycline treatment. This lamb belongs to a group of lambs that had the same clinical signs, which are bred at open housing system in this region characterized by cold weather present in this period of the year (as a potential stress factor). Necropsy revealed moderate diffuse pulmonary edema and multifocal, caseous abscesses in both lungs and liver. No gross pathological changes were detected in any other organs or tissues.

### 2. Bacteriological Examination

Abscess contents from different areas of the lungs and liver, were aseptically collected and plated on blood and MacConkey media, and incubated aerobically at 37°C. Culture plates were examined daily for three days. The growth was classified as heavy, moderate, and light (three or less colonies were considered insignificant, most probably contaminant). Primary isolated and suspected colonies were sub cultivated to obtain pure cultures, and were identified as *Klebsiella pneumoniae* based on standard procedures; such as colonial morphology, gram stain and classical biochemical characteristics (cytochrome oxidase, catalase, indole production, urease production, sulfhydryl acid production on T.S.I. medium (oxid) and oxidation / fermentation tests (Quinn et al., 1994). The antimicrobial susceptibility testing was carried out by disk diffusion test, using ten standard antimicrobial discs (oxid), which were Ceftriaxon (30 µg), Ceftazidime (30 µg), Imipenem (10 µg), Aztreonam (30 µg), Gentamycin (10 µg), Amikacin (30 µg), Ciprofloxacin (5 µg), Chloramphenicol (30 µg), Co-trimoxazole (25 µg) and Tetracycline (30 µg). After preparation of the standardized inoculum with sterile nutrient broth (density 0.5 McFarland), Muller Hinton agar (oxid) plate was inoculated with even distribution of the bacterial suspension all over the plate. Then, using the pointed forceps, the antimicrobial discs were applied onto the surface of inoculated plate, which was then incubated at 37°C for 24 hours. The degree of susceptibility was determined by measuring of the zone of growth inhibition (in mm) and the results were interpreted according to the CLSI (formerly NCCLS) standard (CLSI, 2010).

## RESULTS AND DISCUSSION

Little published reports indicated that *Klebsiella pneumoniae* has caused multiple pulmonary and liver abscesses in sheep, thus this report proved that this microorganism can cause multiple abscesses in the lungs and liver of young lambs. However, it has been known to cause lung abscesses in adult sheep as recorded by Azizi et al. (2013), who isolated *Klebsiella pneumoniae* from the pulmonary abscesses of slaughtered sheep in Iran. Also, Gameel et al. (1991) recovered *Klebsiella pneumoniae* subspecies *ozaenae* from small nodules on the chest wall and lungs of sheep slaughtered in Al-Ahsa abattoir, Saudi Arabia. In addition, Boguta et al. (2002) identified *Klebsiella pneumoniae* and *Escherichia coli* from purulent bronchopneumonia of foal necropsy. Donia et al. (2014) reported that *Klebsiella pneumoniae* was the most dominant isolate (27.3%) from pneumonic sheep lungs. They added that *Klebsiella pneumoniae* infection is characterized by presence of metal ions (a virulence factor), which is highly crucial for its survival.

Isolation of *Klebsiella pneumoniae* from pulmonary and liver abscess in this report goes hand to hand with a findings of Fang et al. (2004), who found that *Klebsiella pneumoniae* is a common cause of lung and liver abscesses in immune-compromised human patients with chronic lung disease, malignancies, urinary tract infections, septicemia, soft tissue infections and or diabetes mellitus. On the other hand, Hatem et al. (2013) claimed that further investigations may be needed to ensure if *Klebsiella* has ability to induce abscess itself or it comes as a secondary infection following the primary one since they did not isolate *Klebsiella pneumoniae* in pure culture in any examined abscess (which, in opposite, did occur in this study).

Pulmonary abscesses may be present in many cases of pneumonia in animals and are not recognizable clinically. When the spread is in hematogenous way, large numbers of small abscesses can develop simultaneously in different body organs and tissues (Radostits et al., 2007), which in our case was evidenced in the liver of the dead animal.

Results in table (1) show the susceptibility of isolated *Klebsiella* strain to many antimicrobial agents, including Ceftriaxon, Ceftazidime, Imipenem, Aztreonam, Gentamycin, Amikacin, Ciprofloxacin and Chloramphenicol, and the resistance to Co-trimoxazole and Tetracycline. Tetracycline is the most common used antimicrobial agent in this region and is used for treatment of respiratory infections in sheep, which explain the incurable cases after Tetracycline treatment in this field problem.

**Table (1).** The susceptibility of isolated *Klebsiella pneumoniae* to antimicrobial agents.

Antimicrobial agent	Conc. in the disk ( $\mu\text{g}$ )	Zone of inhibition (mm)	Interpretation of results (CLSI formerly NCCLS standard)		
			Resistant	Intermediate	Susceptible
Ceftriaxon	30	27	$\leq 19$	20-22	$\geq 23$
Ceftazidime	30	32	$\leq 17$	18-20	$\geq 21$
Imipenem	10	27	$\leq 13$	14-15	$\geq 16$
Aztreonam	30	22	$\leq 17$	18-20	$\geq 21$
Gentamycin	10	16	$\leq 12$	13-14	$\geq 15$
Amikacin	30	23	$\leq 14$	15-16	$\geq 17$
Ciprofloxacin	5	34	$\leq 20$	21-30	$\geq 31$
Chloramphenicol	30	23	$\leq 12$	13-17	$\geq 18$
Co-trimoxazole	25	14	$\leq 10$	11-15	$\geq 16$
Tetracycline	30	7	$\leq 11$	12-14	$\geq 15$

## CONCLUSION

*Klebsiella pneumoniae* has been known to cause pneumonia in adult sheep, but this report discuss its ability to cause extensive abscess lesions in the lungs extending to other vital organ (liver) especially in lambs. Other antimicrobial agents rather than tetracycline should be used in these cases. Further studies are needed for molecular characterization of this bacterial species and immunological response against its infection for vaccine preparation.

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**تقرير حالة**  
**تجمعات صديدية متعددة في الرنتين والكبد نتيجة الإصابة بميكروب الكلبسيلا**  
**الرئوية في حمل بمدينة سيدي براني محافظة مطروح، مصر**

**إسلام وصيف\* وعادل القطان**

قسم صحة الحيوان، مركز بحوث الصحراء، المطرية، القاهرة، مصر

لوحظ نفوق عدد كبير من الحملان في مدينة سيدي براني بمحافظة مطروح، مصر، خلال موسم شتاء ٢٠١٤-٢٠١٥. وبالكشف على أحد هذه الحملان النافقة، تبلىغ حوالي ٣ أشهر من العمر، والتي كانت تعاني من أعراض مرضية متمثلة في الضعف والهزال، كشف الوصف التشريحي عن وجود خراجات متعددة في الرنتين والكبد. وتم عزل الكلبسيلا الرئوية من هذه الإصابات. وبإجراء إختبار الحساسية عليها لمعرفة أنسب المضادات الحيوية، وجد مقاومة هذا الميكروب للنتراسايكلين والذي يعتبر من أكثر المضادات المستخدمة في هذه المنطقة في العلاج. وكانت أكثر حساسية للجنتاميسين والكلورامفينيكول، مما يؤكد أهمية إجراء مثل هذه الإختبارات بصفة دورية. وتعطي هذه الدراسة دليلاً على أن الكلبسيلا الرئوية يمكن أن تسبب تجمعات صديدية متعددة في الرنتين والكبد في الحملان الصغيرة.