Non-Healing Chronic Cutaneous Abscess Wound Infected with *Proteus Mirabilis* in A Shami Goat

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**Abstract**

*A wound is the disruption in the continuity of skin. Infected wound leads to collection of pus in a cavity formed by disintegration of tissues within the dermis or deeper skin tissues leading to cutaneous abscess. Cutaneous abscesses wounds are common in goats and sheep but infection due to Proteus mirabilis (P. mirabilis) is very rare. In this case report, a Shami goat which had a ruptured abscess at the neck and head region was initially suspected for caseous lymphadenitis (CLA) caused by Corynebacterium pseudotuberculosis (C. pseudotuberculosis) however, the isolation and identification of pus and blood swab samples in an aseptic manner revealed the presence of Proteus species. The Proteus species showed resistance to wide range of antibiotic used in the treatment and causes a non healing abscess wound in the Shami goat.*

**Key Words:** Wound, cutaneous abscess, Shami goat, Proteus mirabilis, antibiotic resistance

**Introduction**

A wound is the disruption in the continuity of skin. As the first line body defense breaks down, wound colonization and infection may take place. Infected wound leads to collection of pus in a cavity formed by disintegration of tissues within the dermis or deeper skin tissues. Conducive environment for microbial growth in wounds which is damp, warm and nutritive leads to delay in healing and damage to the host tissues Ohalete et al (2012). Microorganisms ranging from virus, bacteria, fungus and parasites are responsible for the infection of wounds. The common bacteria found through isolation are Streptococcus pyogenes, Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli, Klebsiella species and Proteus species. The fungal organisms commonly found are Candida and Aspergillus species Mordi et al (2009). *Proteus mirabilis* (P. mirabilis) is from the family of enterobacteriaceae, a facultative anaerobe Gram-negative flagellate rod with a swarming motility. The organisms are ubiquitous in the environment and are a normal flora of gastrointestinal tract of many animals and humans Songer and Post (2005). The
organism is the most common aetiological agent isolated from humans associated with urinary tract and wound infections. P. mirabilis accounted for 60-90% of all infections caused by Proteus species. The difference in the prevalence rates may be related to the organism distribution in various environments Mordi et al (2009); Yah et al (2007); Feglo et al (2010). In animals, the organism is frequently isolated from dogs with urinary tract infection (cystitis, pyelonephritis, and prostatitis), abscesses, wounds, otitis externa and diarrhea in young animals of canines, mustelids and ruminants Songer and Post (2005). P. mirabilis is considered as an opportunistic and always implicated with contamination in the Human and Veterinary medicine Manos et al (2006). The organism has also been reported increasingly becoming resistance to wide range of antimicrobial drugs such as ampicillin, trimethoprim/sulfamethoxazole, tetracycline and chloramphenicol Feglo et al (2010). This case report details on non healing chronic cutaneous abscess wound infected with P. mirabilis in a male Shami goat.

**Case History**

A 2 and a half-year-old, 40 kg male Shami goat managed intensively in a small holder farm was presented on the 8th September, 2012 with a marked swelling and ruptured cutaneous abscess located at the right dorsolateral C2- C3 of the neck region (Figure 1 and 2). The body condition score (BCS) was 3/5, the body temperature was 38.7 °C, pulse and respiratory rates were 72 bpm and 40 cycles per minute respectively and there was no enlargement of any lymph node through palpation.

The ruptured abscess was lanced and swab samples were collected for bacterial isolation and identification including an antibiotic sensitivity test. Penicillin G- Streptomycin (Pen-Strep, Norbrook®,) and Flunixin meglumine (Flunixin, Norbrook®, 2.2 mg/kg i.m.) were administered on that day. A differential diagnosis of caseous lymphadenitis (CLA), bacterial infected wound and fungal infected wound were established. On the second visit to the farm, the ruptured abscess was still persistence with dried pus and there was a new fistulation opening at the dorsal atlas-axis region of the neck. The farm personnel were treating the wound with long acting penicillin (Benacillin, Ilium, dosage unknown) and Margosa oil (Neem oil). The initial abscess swab sample for bacterial culture revealed pure culture of P. mirabilis and was not susceptible to streptomycin, amoxicillin and tetracycline.
The ruptured cutaneous abscess was managed by shaving and cleaning the area with Chlorhexidine, pus was removed using hand compress from all the opening and washed with Chlorohexydine, continued with Hydrogen peroxide (H₂O₂) and flushed with 0.9% Sodium Chloride. This is important to avoid tissue damage that might be caused by H₂O₂. 2ml of third generation cephalosporin, Ceftiofur (Excede™, 50mg/ml) was infused topically into the ruptured abscess. This is to act directly on any bacteria at the affected site. Iodine and Negasunt were mixed to form paste and were stuffed into the abscess cavity. Finally, Ceftiofur (Excede™, 50mg/ml, 1.1mg/kg, i.m., s.i.d.) was administered for 3 days as a prophylaxis against systemic infection (Zewde et al., 2008) as indicated in (Figure 3).

Ten days post-treatment the swelling and abscess wound was healing without any discharged and was dry. However, 1 week later there was a new fistulation opening with small amount of pus, 3 cm below the second fistulation at the dorsal atlas-axis of the neck region. A second swab sample was collected on the third visit to the farm. The swab sample was collected aseptically after cleaning and flushing the wound with Chlorhexidine for bacterial isolation and identification. The swabs were moved in a rotational manner within the abscess cavity from all the opening of the abscess. Bacteriology result revealed that all 3 swab samples collected were negative for other bacteria, except pure culture of P. mirabilis and was resistant to the same antibiotics mentioned initially. A definitive diagnosis of P. mirabilis infected wound was concluded as confirmatory based on the bacterial culture and isolation evidence. However, the
prognosis of the infection was good after gentamicin therapy, perhaps gentamicin could be a better option of antibiotic for the treatment of the cutaneous wound.

Figure 3: Ruptured abscess wound treatment.
Abscesses involving the cutaneous layer or lymph nodes in goats and sheep are highly endemic in many countries of the world Alharbi (2011). The prevalence of the disease among goats and sheep depends on the environment Alloui et al (2011). Animals that showed similar signs of abscesses were suggestive of CLA caused by C. pseudotuberculosis; however other bacteria such as Arcanobacterium pyogenes, Staphylococcus aureus subsp. anaerobius, Actinobacillus licheniformis and Pasteurella multocida, can be the causal agent of the abscess. Bacterial isolation is necessary for the identification of the causative agent Guimarães et al (2011). In the present case report, P. mirabilis was the sole organism isolated from the ruptured abscess. According to Champs et al (2000) P. mirabilis is commonly isolated with other microorganisms, but in certain infections only pure culture of P. mirabilis may be isolated. It is highly believed that the organism had been the agent causing prolong non healing abscess wound in the Shami goat. In the human medicine aspect occurrence of P. mirabilis in human infections especially in wound and urinary tract infections have been reported by many researchers Feglo et al (2011); Champs et al (2000); Mordi et al (2008); Endimiani et al (2005); Jabalameli et al (2005); Sosa et al (2006). Although wound contamination would not persist, but bacterial species that were present may multiply and establish their colonies causing delayed in wound healing, wound breakdown, herniation, and complete wound dehiscence Mordi et al (2009); Ohalete et al (2012). Mordi et al (2009) in his study reported that the proteus species were the common bacteria isolated from wound infection. He also claimed that among four pathogenic Proteus species isolated from wounds of patients in the University of Benin Teaching Hospital (UBTH), P. mirabilis was the most common followed by P. vulgaris. P. rettgeri and P. morgani. Pirinccioglu et al (2012) reported a case of a 2 year old boy with lumbar epidermoid tumor who had a late onset of P. mirabilis meningitis and spinal intradural abscess. Furthermore, Irfan et al (2007) reported a rare case of pure culture of P. mirabilis was isolated from an intramuscular abscess of the right sternocleidomastoid in a 40 year old male patient. In veterinary medicine, Andrade et al (2012) reported that pure culture of P. mirabilis was among the isolates cultured from sheep and goats showing clinical signs of caseous lymphadenitis especially from the prescapular lymph nodes. According to Gatoria et al (2006), P. mirabilis is the aetiological agent causing urinary tract infections in dogs with urolithiasis as they were isolated and cultured from urine, bladder mucosal biopsy and urolith through cytocentesis and cystotomy respectively. Co-infection of P. mirabilis with other bacteria, yeast in otitis media was also prolonged and increases the severity of otitis externa in dogs and cats Edmund (2004). The Proteus species isolated showed resistance to streptomycin, amoxicillin and tetracycline antibiotics and the findings were in consonance with that of Feglo et al (2010) where he found that, 70 – 90 % of P. mirabilis and P. vulgaris isolates exhibited resistance to ampicillin, trimethoprim/sulfamethoxazole, tetracycline
and chloramphenicol. More so, (Mordi et al (2009); Yah et al (2009) suggested, that the extra outer cytoplasmic membrane of P. mirabilis which contains a lipid bilayer, lipoproteins, polysaccharides and lipopolysaccharides, including misuse of antibiotics could be the contributing factors in the resistance of the bacteria towards certain antibiotics. On the other hand, Yah et al (2007) describes that Proteus species have the ability to carry genes (plasmid resistant genes) encoding antibiotic resistance.

**Conclusion**

In conclusion cutaneous abscesses are common in goats and sheep but infection due to P. mirabilis is very rare. Definitive diagnosis for any other bacteria is only through bacterial isolation and identification including an antibiotic susceptibility test. Although P. mirabilis is commonly isolated in combination with other organisms, in the present case report it is of clinical relevance as it was the only organism involved in the infection. These finding suggest that P. mirabilis played an important role in the pathogenicity of the non-healing wound in the Shami goat. Further investigation of this Proteus species is encouraged in order to solve the pathogenicity factors as the organism showed wide range of antibiotic resistance.

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**References**


Pirinciooglu AG, Ulu MO and Guzel A. 2012. Late onset Proteus Mirabilis Meningitis and Subdural Abscess in a Boy with Lumbosacral Epidermoid Tumor: Case Report: Journal of Neurological Sciences (Turkish). 29(1): 129-135


