

Methicillin Susceptible *Staphylococcus aureus* is the predominant Organism in Septic Bursitis with the Majority Involving the Olecranon Bursa: A Study of 65 Cases

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ABSTRACT

Bursae are fluid filled structures between mobile parts of the musculoskeletal system to reduce friction by lubrication. Repeated trauma to bursae results in bursitis which are usually aseptic initially, which may be followed by infection. Many cases are related to occupational or recreational activities. We present an analysis of cases of *Staphylococcus aureus* septic bursitis admitted to 10 hospitals over a 3-year period. The olecranon bursa was the most common site involved 42/65 (64.6%) followed by prepatellar bursa 17/65 (26.1%). The mean age was 61.2 years. Fifty five out of Sixty-five (84.6%) were male. The majority were caused by methicillin susceptible *Staphylococcus aureus* 52/65 (80%). The occupational history was missing for most patients. The occupations reported in few of the patient charts were floor worker, construction worker and roofer. Sixty one out of sixty-five (92.4%) of cases involved the elbow and knee. Avoidance of activities that result in repeated friction or trauma to elbows and knees would prevent majority of cases of septic bursitis.

KEYWORDS

Bursitis, *Staphylococcus aureus*, Olecranon bursa, Prepatellar bursa.

Background

Bursae are fluid filled structures between mobile parts of the musculoskeletal system to reduce friction by lubrication. Of the many bursae in the human body, the most frequently infected are the olecranon and pre-patellar bursae. In reported studies of septic bursitis, there is a strong male preponderance and a relationship to occupational or recreational activities in over half the cases with a mean age of around 50-60 years. The most frequent offending organism is *Staphylococcus aureus* [1,2]. The frequency of methicillin resistance is not well documented. We present clinical findings in 65 cases of staphylococcal septic bursitis. As far as we are aware, this study is one of the largest series published [3-5].

Methods

We analyzed approximately 7000 *Staphylococcus aureus* cultures reported by the laboratory from 10 hospitals of our network, 9 in Eastern Pennsylvania and 1 in adjacent Warren County, New Jersey for a period of 3 years ending in October 2019 and found 65 cases of septic bursitis. There were 55 males (84.6%) and 10 females (15.4%). The age range was 23-93 (mean age 61.2). We were initially studying septic arthritis and found that fluid specimens from the olecranon bursa and pre-patellar bursa were mislabeled elbow or knee. This prompted further evaluation of all specimens collected from bursae in different sites of the body.

Results

Olecranon bursa was the most common site involved (42/65 64.6%) followed by pre-patellar bursa (17/65 26.1%) with smaller numbers affecting other bursae (Table 1). The majority of *Staphylococcus aureus* was methicillin susceptible (MSSA) 52/65 (80%). Twenty percent were methicillin resistant (13/65) (Table 2). The distribution of methicillin resistance at different sites is shown in table 3.

The occupational associations were not recorded in the chart in most cases. The few with the occupations recorded included roofers, construction workers and floor workers. The majority were successfully treated with surgical drainage and antibiotics.

Olecranon septic bursitis	42/65	64.6%
Pre-patellar septic bursitis	17/65	26.1%
Subacromial septic bursitis	4/65	6.2%
Infra-patellar septic bursitis	1/65	1.5%
Suprapatellar septic bursitis	1/65	1.5%

Table 1: Distribution of septic bursitis.

Methicillin susceptible <i>Staphylococcus aureus</i> (MSSA)	52/65	80%
Methicillin resistant <i>Staphylococcus aureus</i> (MRSA)	13/65	20%

Table 2: Methicillin susceptibility of *Staphylococcus aureus* septic bursitis.

Bursa	MSSA	MRSA
Olecranon	34	8
Pre-patellar	13	4
Sub-acromial	3	1
Supra-patellar	1	

Table 3: The distribution of methicillin resistance in *Staphylococcus aureus* septic bursitis.

Discussion

Majority of septic bursitis involves olecranon and pre-patellar bursae. In most studies involvement of the olecranon bursa was more common with a male preponderance, a mean age of 50-60 range, an occupational association in many cases and approximately 80% caused by *Staphylococcus aureus*. Other etiological agents reported include other gram positive bacteria (*Streptococcus agalactiae*, *Streptococcus pneumoniae*, *Staphylococcus epidermidis*, *Enterococcus*, *Cutibacterium*, *Nocardia asiatica*), gram negative bacteria (*Escherichia coli*, *Pseudomonas aeruginosa*, *meningococcus*, *Stenotrophomonas maltophilia*, *Brucella abortus*), anaerobes, mycobacteria (*Mycobacterium marinum*, *Mycobacterium kansasii*), fungi (*Candida glabrata*, *Fusarium solani*), unusual organisms (*Prototheca wickerhamii*, an algal opportunistic pathogen) and "mixed flora" [1,2, 6-14].

Bursitis is often associated with repetitive trauma. Multiple

occupations associated with bursitis reported are carpet layer, plumber, stone mason, roofer, carpenter, clergy, wrestler and athlete [1,2,14,15].

Approximately 1/3 of bursitis cases are septic and 2/3 non-septic according to a 2014 study [17]. Etiologic agent is initially identified usually by culture of an aspirate. The treatments for septic bursitis have included antibiotics with or without surgical excision of the bursa. Endoscopic or non-endoscopic excision of the infected bursal sack has been achieved successfully in many reports [18,19]. Other modes of treatment include treatment of refractory septic bursitis using percutaneous placement of a suction-irrigation system [6,20].

In our study population most, septic bursitis was caused by MSSA (80%). Majority were treated with cefazolin or ceftriaxone or oxacillin and surgical drainage. MRSA cases and penicillin allergic patients all received vancomycin.

Summary and conclusions

The olecranon bursa was the most common site involved 42/65 [64.6%]. Males 55/65 [84.6%] significantly outnumbered females 10/65 [15.4%]. The majority [80%] were caused by MSSA. The mean age 61 was higher than most previous reports. The elbows and knees accounted for 61/65 [92.4%] cases of septic bursitis. Avoidance of activities that result in friction or repeated trauma to elbows and knees should help prevent septic bursitis.

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