Can CT guided bone biopsy be excluded as an option for the diagnosis of osteomyelitis based on the clinical findings?

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INTRODUCTION

- Osteomyelitis is inflammation within the bone and bone marrow, typically resulting from an infectious source. The yearly incidence rate of osteomyelitis is around 22 per 100,000 people in the United States.
- MRI the most sensitive and specific imaging modality for the diagnosis of osteomyelitis. However, CT guided bone biopsy is seldom ordered to confirm the diagnosis or guide antibiotic therapy.
- Positive rates for bone biopsy were previously thought to be high. However, recent literature reported positive rates of around 30%.
- This study was performed to detect whether patients without any clinical/lab findings such as fever, leukocytosis, and positive blood culture would benefit at all from the procedure.

MATERIALS AND METHODS

- The study was approved by the Institutional Review Board (IRB). We conducted a thorough review of the Radiology PACS for “bone biopsy” at our institution between 2015 and 2020.
- Inclusion Criteria: Adults who had a CT guided bone biopsy for the indication of “Osteomyelitis”.
- Exclusion Criteria: Those who had bone biopsy for another indication such as malignancy, patients younger than 18 years of age, and those with unavailable medical records.
- All procedures were performed under moderate sedation with the use of local anesthetic. Targeted biopsy was performed under CT guidance utilizing a bone biopsy needle (Figure 1).
- For each procedure, age, gender, diabetes status, history of antibiotic use, presence of fever, leukocytosis, and blood culture results were recorded.
- Patients with a positive pathology and/or culture were considered positive for osteomyelitis, whereas those showing negative culture or pathology with the other parameter being negative, inconclusive, or unavailable were considered negative.

MATERIALS AND METHODS - CONT’D

- Each patient was given a score of 1 point was given to each of fever, leukocytosis, and positive blood culture, with the total score being 0 to 3.
- Comparison of the mean age between those with positive bone biopsy for osteomyelitis and those with negative biopsy was done using independent t-test. Comparison of other factors including gender, history of antibiotic use, presence of diabetes, fever, leukocytosis or positive blood culture to biopsy result was done using Fisher exact test. Fisher’s test was also used to compare percentages of patients with positive and negative biopsy results among each group based on their score of 0, 1, 2, or 3.

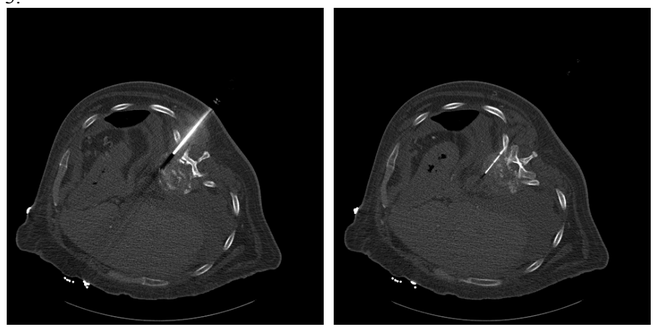

Figure 1. CT guided bone biopsy in a 59 year old male patient with destructive lesion in the thoracic vertebra suspicious for osteomyelitis.

RESULTS

- 65 patients were included in the analysis. 35% (n=23) had positive bone biopsy. The mean age for patients was 56 years, 75% (n=49) were males, 26% (n = 6) had diabetes, and 42% (n=27) received antibiotics prior to the procedure. Prior to the bone biopsy procedure, 26% (n=14) patients had leukocytosis, 14% (n=9) had a fever, and 26% (n=17) had positive blood culture.

RESULTS - CONT’D

- The lumbar spine was the most common target site (42%; n=27). The most commonly used biopsy needle size was 18 G (31%; n=20). Number of core biopsies obtained were one or two in most of the cases (62%; n= 40).
- The only significant differences between the osteomyelitis and the negative groups were for leukocytosis (p=0.02) and positive blood culture (p=0.01) which were significantly higher in patients with positive biopsy (44% and 40%, respectively), compared to those with negative biopsies (17% and 12%, respectively).
- Based on scoring, patients with a score of 0 (indicating no positive clinical or laboratory factors) or a score of 1 (with only one positive factor) were significantly more likely to have a negative bone biopsy (69% and 86%, respectively, p <0.01). Conversely, with scores of 2 or 3 (indicating at least two positive clinical and/or laboratory findings) were significantly more frequently associated with a positive biopsy (86% and 75%, respectively, p <0.01) (Table 1).

Total score	Osteomyelitis (n=23)	Negative (n=42)	Total (n=65)	P-value
0	12 (31%)	27 (69%)	39 (100%)	**<0.01**
1	2 (14%)	12 (86%)	14 (100%)	**<0.01**
2	6 (86%)	1 (14%)	7 (100%)	**<0.01**
3	3 (75%)	1 (25%)	4 (100%)	**<0.01**

Table 1. Comparison between positive and negative biopsy results based on scoring.

CONCLUSION

CT guided bone biopsy should be avoided in patients with no/limited clinical and lab findings, and targeted to those with multiple positive clinical and lab findings, especially if the results will change the management. Leukocytosis and positive blood culture are associated with higher rates for positive bone biopsy results.