Image guided soft tissue biopsy in children: Are there predictors for success?

The Problem
Image guided percutaneous core needle biopsy (PCNB) of soft tissue lesions is a minimally invasive technique that can provide a definitive diagnosis. There are, however, limited data on the determinants of diagnostic yield in pediatric soft tissues lesions. It is essential to identify opportunities for quality improvement, such as standardizing the number of passes, needle gauge, or type of imaging guidance.

Aim/Goal
To assess overall diagnostic yield and the impact of lesion related and technical factors in PCNB of pediatric soft tissue lesions over a 14-year period.

The Team
Diagnostic Radiology        Interventional Radiology
Nursing                             Anesthesia

The Interventions
- Retrospective cohort study of 205 PCNB performed at Children’s Hospital Boston between January 2000 and July 2014.
- Lesion variables included location, pathology, size and volume.
- Technical variables included radiologist’s experience, sedation type, guidance modality, biopsy needle type and gauge and the number of passes made.
- Final pathologic diagnosis and clinical course were used to determine the diagnostic success of the biopsy.

The Results/Progress to Date
The mean patient age was 11.1 ± 6.9 years. Ultrasound guidance was used in 91% of cases. The mean number of passes was 7.5±3.2 per case. The overall diagnostic yield was 75% and the overall accuracy was 88%. There were no technical or lesion related factors that predicted a diagnostic biopsy (Tables 1 and 2). On bivariate analysis, performing less than 4.3 passes (p= 0.09) trended toward a significant association with non-diagnostic biopsies. There were two complications over 14 years.

Lessons Learned
- The overall diagnostic yield of 75% is above the 70% threshold for quality improvement in musculoskeletal biopsies as suggested by the American College of Radiology. The PCNB accuracy of 88% also falls within previously reported rates in both adults and pediatric patients.
- Although this is one of the largest pediatric PCNB studies to date, it was not powered to detect small effect sizes. There may be some factors that were not apparent in this cohort that are amenable to quality improvement.

Next Steps/What Should Happen Next
- A prospective study would allow biopsy specimens to be evaluated in sequence, allowing identification of a plateau for the number of specimens needed for definitive diagnosis.
- This research should serve as a guide for future studies on image-guided pediatric procedures.

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