Frozen Section for Hip and Knee Joint Revisions

To the Editor

As Kanner et al1 state, there are many studies with differing criteria established for infection/inflammation when reading intraoperative frozen sections, and while the specificity of the procedure is very good, orthopedic surgeons tend not to use the results selectively. It is interesting that the authors selected the criteria of Mirra et al,2 because in their studies Mirra et al used a high-power objective of 50×, whereas most other authors cited in the remaining studies used a 40× objective. All other things being equal, that would correspond to approximately 20% fewer cells in a high-power field in the study by Mirra et al.2 If one could then equate all reported studies, this should imply that with a 40× objective, one should be able to diagnose the inflammatory threshold with a 20% lower polymorphonuclear leukocyte (PMN) count.

Unfortunately, while each study may be internally valid, there is to date none that also reports the field diameter of the ocular used on the same microscope. The only thing that 40× objectives on different microscopes have in common is that if the same power ocular is used on each, the cells will appear the same size in each microscope. On the other hand, the total field area is determined by the internal field diameter of the ocular. If one observes the same field with a 40× objective and a 28-mm field diameter, 10× ocular, a count of 5 PMNs per high-power field would equate to about 3 PMNs per high-power field in the same field using a 22-mm field diameter ocular. This probably means that until standardizing data are reported for each microscope used in published studies, internal guidelines should be established between orthopedic surgeons and the pathologists attempting to guide them at individual institutions.

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References

The Author’s Reply

Dr Klein makes a valid point about our recent article1 on frozen section (FS) analysis of hip and knee tissue at joint revision surgery. He notes that the authors have not taken into account microscopic field area when using the criteria of Mirra et al2 for counting PMNs in FS analysis of joint tissue. The importance of field area has long been emphasized in studies of counting cells, mitotic figures, vascular channels, etc.3,4 In all studies reviewed by us, including that of Mirra et al,2 the field area, which depends on the ocular piece, was not specified. Mirra et al2 used a 50× objective in identifying PMNs, whereas most pathologists use a 40× objective for the high-power field. Hence, our study in which the field area was 0.238 mm² is likely not identical to that of Mirra et al,2 and it is possible that no studies have used identical criteria and field area.

Using different field areas for counting PMNs might change the rates of sensitivity and specificity of FS for determining the possibility of joint infection. Despite the variable criteria used among studies, in our investigation and those of others, however, the specificity of FS has been high, while the sensitivity has been low. It should be mentioned that counting PMNs in an FS slide of joint tissue is not necessarily simple, and considerations in evaluating PMNs include determining the foci with the largest number of PMNs, not mistaking distorted lymphocytes for PMNs, distinguishing tissue from exudate, and not counting PMNs within vascular channels. These histopathologic details might lead to low interobserver reproducibility, although this has not been evaluated in studies thus far.

The chief point in our article was that FS examination has been used unselectively in assessing the possibility of infection in joint tissue. A prospective study of FS along with preoperative erythrocyte sedimentation rate and C-reactive protein and patient outcome results might be useful in the future to guide more appropriate requests for FS by orthopedic surgeons. In addition, with a sufficient number of cases and taking into account a defined field area, the cutoff values for PMNs that are predictive of joint infection might be refined.

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References


