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A multidisciplinary approach improves liver biopsy adequacy through a change in the selection of percutaneous biopsy needle

The College's Clinical Effectiveness Department wishes to encourage high-quality clinical audit. We therefore periodically publish interesting examples of audits that have been successfully evaluated through our clinical audit certification scheme.

Background

A non-targeted or medical liver biopsy specimen is a slender core of tissue that represents approximately 1/50,000 of the total liver mass. It may be taken to support the diagnosis, grading and staging of diffuse liver disease, which may arise from a wide range of aetiologies. Accurate assessment of disease activity and fibrosis, particularly in relation to the chronic viral hepatitis, has been shown to be impeded by inadequate tissue sampling. Shorter biopsies may lead to an underestimation of disease grade and stage but the inclusion of more than 11 to 15 portal tracts has been shown not to affect significantly the grading and staging of disease.[1] Fibrosis scores have also been shown to be correct in 75% of liver cores measuring 25 mm in length, and no major improvement is achieved with longer samples.[2]

A systematic review defined the optimal liver biopsy as 20–25 mm in length and/or containing more than 11 complete portal tracts.[3] This has been adapted by The Royal College of Pathologists (RCPath) into updated 2014 guidelines (Table 1), which define: an adequate core biopsy as 25 mm or more in length and containing 11 or more portal tracts; a compromised core biopsy as under 25 mm in length and containing 6–10 portal tracts; and an inadequate core biopsy as containing fewer than 6 portal tracts.[4]

Table 1: Current 2014 criteria for liver biopsy adequacy[4]

	Core length		Number of portal tracts
Adequate	≥25mm	and	≥11
Compromised	<25mm	and	6 to 10
Inadequate			<6

Table 2: Previous 2008 criteria for liver biopsy adequacy[6]

	Core length		Number of portal tracts
Adequate	≥20mm	and	≥11
Compromised	10mm to 20mm	and	6 to 10
Inadequate	<10mm	and/or	<6

A recent short report demonstrated continued liver core biopsy compromise (56.4%) and inadequacy (23.8%),[5] based on the 2008 RCPath guidelines[6] (Table 2). This trend was also observed by histopathologists at East Sussex Healthcare NHS Trust (ESHT), with a high proportion of liver biopsy specimens failing to meet adequate standards. It was decided that this needed to be addressed objectively through audit involving interventional radiology colleagues, given the advancement in tissue core biopsy needles.

Aims and objectives

The aim of the audit reported here was to improve the adequacy of liver biopsy specimens submitted to Cellular Pathology at ESHT. This was to be accomplished by correlating liver biopsy adequacy, according to RCPath guidelines, with the types of percutaneous biopsy needle used and individual needle operators to identify best practice in achieving adequate non-targeted liver biopsy specimens.

Methods

Over the 12-month period November 2012 to November 2013, 59 non-targeted liver biopsy specimens were submitted to Cellular Pathology at ESHT. Of these, 78% (n = 46) were performed by four main operators and 75% (n = 45) were performed percutaneously. The adequacy of each percutaneous specimen was assessed according to the 2008 RCPath guidelines.[6] Following implementation of the recommendations of the initial audit, a re-audit was performed of liver biopsy adequacy over the six-month period September 2014 to March 2015. It identified 13 non-targeted liver biopsy specimens, of which seven were performed percutaneously and assessed for adequacy according to the updated RCPath 2014 guidelines.[4]

Results

In the initial audit, percutaneous liver biopsy was

performed predominantly using the Temno® coaxial or the Biopince™ needle systems. Using the Temno® needle, 29 liver biopsy cores were taken, of which 31% (n = 9) were adequate, 45% (n = 13) were compromised and 24% (n = 7) were inadequate (Figure 1). In comparison, of the 16 liver biopsy cores taken with the Biopince™ needle, which was introduced part way through the audit period, a greater proportion (94%) and overall number (n = 15) were adequate; only one liver core biopsy was compromised and none were inadequate (Figure 2).

To rule out potential bias from a single operator, a sub-analysis of the adequacy rates of percutaneous biopsies using the Temno® needle or Biopince™ needle yielded by the four main operators was performed. This showed variable adequacy rates of liver core biopsies taken with the Temno® needle but consistently adequate liver core biopsies taken with the Biopince™ needle (Figure 3).

In light of the apparent operator-independent increase in liver biopsy adequacy, it was recommended that the Biopince™ needle be used routinely for non-targeted percutaneous liver biopsy. The re-audit showed adoption of the recommendation, with all fully documented percutaneous liver biopsies taken with the Biopince™ needle. Of these, 72% (n = 5) were adequate, 14% (n = 1) were compromised and 14% (n = 1) were inadequate (Figure 4).

Figure 1: Adequacy of liver biopsies (according to the 2008 RCPath criteria[6]) taken with the Temno® needle (n = 29)

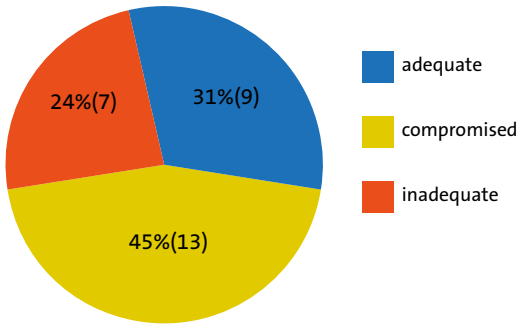


Figure 2: Adequacy of liver biopsies (according to the 2008 RCPath criteria[6]) taken with the Biopince™ needle (n = 16)

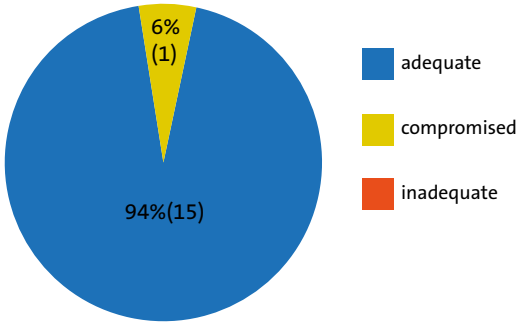


Figure 3: Comparison of adequacy of liver biopsies taken with the Temno® and Biopince™ needles for each of the four main operators

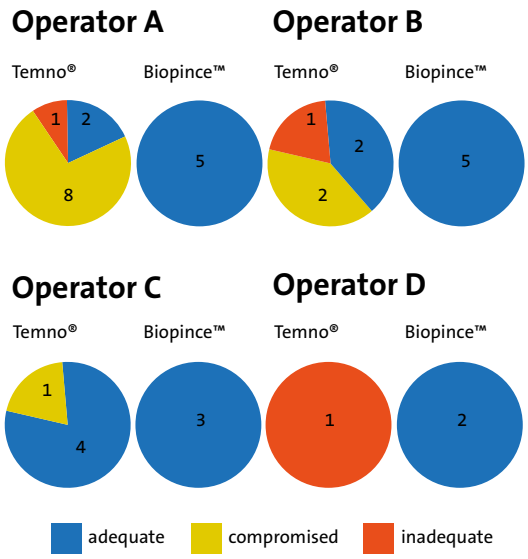
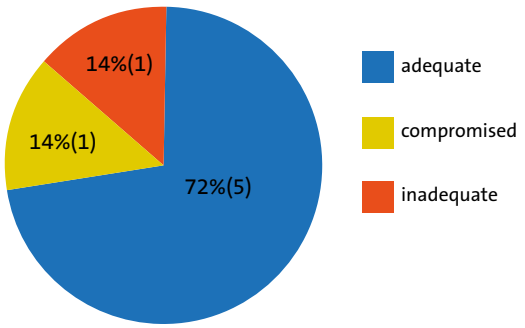


Figure 4: Adequacy of liver biopsies (according to the 2014 RCPath criteria[4]) taken with the Biopince™ needle (n = 7)



Summary and conclusion

Liver biopsy remains the standard for the diagnosis, staging and grading of diffuse liver disease. However, due to the patchy nature of many liver diseases, reliable analysis is dependent on the adequacy of the biopsy specimen, which is related to the length of the tissue core and the number of portal tracts included. Continued reports of specimen inadequacy, despite clear RCPath guidelines, were reflected locally at ESHT and it has been demonstrated that this can be addressed through a multidisciplinary approach between histopathologists and interventional radiologists.

An agreed change to the type of needle used by interventional radiologists has shown a sustained and operator-independent improvement in adequacy rates for percutaneous liver core biopsy.

This audit is limited by overall numbers, particularly at the re-audit stage, for indiscernible reasons; however, initial results indicate that the 98% standard for liver biopsy adequacy should be achievable through this change in practice.[7]

Liver biopsy carries significant risks. Concern was voiced that an increase in procedure-related complications, and haemorrhagic complications in particular, might result if the aim was to achieve larger liver core biopsies. A small audit of the cases identified between September 2014 and March 2015 showed no report of haemorrhagic complications; however, this remains an important area to monitor.[8]

Overall, this audit demonstrates the importance of ongoing feedback and working with clinical colleagues to achieve an improvement in liver biopsy adequacy, to meet current standards and ensure accurate analysis of liver tissue to guide patient care.

Action plan

Audit number and title	3650: Re-audit: A multidisciplinary approach improves liver biopsy adequacy through a change in percutaneous biopsy needle selection		
Recommendation	**SMART action point**	**Person responsible**	**Comments / action status**
Routine reporting of portal tract number	All medical liver biopsy reports should contain a count of portal tracts.	Dr K Sleigh	Agreed and actioned at pathology audit meeting on 13/09/15
Ongoing monitoring of liver biopsy adequacy and consideration of re-audit	All medical liver biopsy reports should contain a comment on adequacy according to 2014 RCPath criteria. Consider re-audit in 12 months. Audit standard: 98% adequacy.[7]	Dr K Sleigh	For discussion by action date deadline on 02/12/16
Routine use of Interventional Radiology Care Pathway for inpatient and outpatient procedures	The interventional care pathway is available at the point of care and should be used as the routine record keeping document for inpatient and day case liver biopsies.	Dr M Farris and Dr J Harris	Agreed and in action as discussed at radiology audit meeting on 02/12/15
Ongoing monitoring for procedure related complications and consideration of re-audit	Consider re-audit of post procedure complications. Audit standards: <30% minor pain, <3% severe pain, <3% vasovagal hypotension, <0.5% significant haemorrhage, <0.1% haemobilia, <0.1% other viscera perforation and <0.1% mortality.[8]	Dr M Farris and Dr J Harris	For discussion by action date deadline on 02/12/16

Declaration of conflicting interest
The authors declare that there is no conflict of interest.

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