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Comparison of the Trucut and Surecut liver biopsy needles

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SUMMARY The Trucut and Surecut liver biopsy needles have been compared in a prospective randomised study. Although the Surecut specimens were longer and heavier they tended to fragment during processing. Trucut specimens were subject to less artefact and were rated more highly by the histopathologist. However, the majority of biopsies obtained by both needles were satisfactory for diagnostic purposes.

Needle biopsy of the liver is now established as a safe and useful diagnostic procedure.[1] A number of different needles are available but few formal comparisons of their respective merits have been made.[2] We have evaluated a newly introduced modification of the Menghini needle (Surecut) and the Trucut needle in a prospective controlled study.

Material, patients and methods

MATERIAL

The Trucut needle (Travenol Laboratories) combines an interlocking cannula and trochar which has a 2 cm long notch cut out of one side to receive the biopsy specimen. The outside diameter is 2·032 mm. It was used as previously described[3] and needles were not reused.

The Surecut needle (American Hospital Supply) is a disposable modified Menghini needle but with a central stilette attached to the plunger of an integral syringe. The stilette extends the whole length of the needle and emerges to form a pointed tip. The outside diameter of the needles used was 1·8 mm but a range of different sized needles is available.

The skin and intercostal muscle are punctured in the usual manner but before the needle is inserted into the liver the plunger and stilette are withdrawn and held in position by a ratchet. The needle is then advanced into the liver and withdrawn, and the specimen is extruded from the needle by gently releasing the ratchet and advancing the stilette down the needle. Great care is needed to avoid fragmentation of the specimen.

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PATIENTS

One hundred and three consecutive patients undergoing diagnostic liver biopsy were randomly allocated to one or other needle. Patients thought to have cirrhosis on clinical grounds were randomised separately. The amount of 2% lignocaine used for local anaesthesia was recorded and the operator assessed ease of biopsy and patient comfort on a five point scale from excellent to poor.

SPECIMEN HANDLING, PROCESSING AND ASSESSMENT

To obtain a straight cylinder of liver tissue, each specimen was mounted by the operator on a rectangular piece of rigid absorbent paper and fixed in neutral formalin. The specimen was sent to the laboratory without any indication of which needle had been used. In the laboratory the handling of the specimen at all stages was done by one MLSO. The specimen was separated from the paper, weighed, the number of fragments present was recorded and their total length measured. They were enveloped in filter paper and processed in an automatic processor within a metal cassette. The specimen was then embedded in paraffin wax and the number of liver fragments in the block were noted. Serial sections 4 μm thick, parallel to the long axis of the cylinder and including the maximum possible area, were cut and mounted on eight numbered glass slides.

The best slide was selected by the pathologist, who counted the number of separate fragments, measured their total length and total area and the length of the largest fragment. He then assessed the presence or absence of artefacts which could have arisen before fixation (diffuse crushing at the edges,

folds and bends of the cylinder) in a 0 to ++++ scale and finally gave a subjective opinion of the quality of each biopsy on a five point scale from poor to excellent.

STATISTICS

Student's t test or the χ^2 test were used to determine the significance of any observed differences.

Results

Fifty-six Trucut and 47 Surecut specimens were obtained. In three patients no liver sample was obtained on two passes using the first needle (two Surecut and one Trucut) but biopsy was successful after changing to the other type of needle; only the successful biopsy is included in the analysis.

There were no significant differences between the two needles for patients comfort, ease of biopsy or amount of lignocaine used. The histological diagnoses are listed in Table 1.

The Surecut needle produced longer and heavier biopsies than the Trucut needle and 77% of all specimens arrived in the laboratory as a single piece (Table 2). After processing, however, the Surecut specimens fragmented more than the Trucut biopsies. Furthermore, the number of fragments counted on the glass slide was greater than those in the block because it was not always possible to obtain a complete section of Surecut specimens which had not been fixed in a straight position. Although the mean total area of liver on the sections of the Surecut biopsies was larger than the Trucut, the mean length of the largest fragment was similar for the two groups.

The Surecut biopsies showed more crush artefact and the overall quality of the biopsy specimen was significantly poorer (Table 3). The above conclusions also held when the 30 patients with a histological diagnosis of cirrhosis were analysed separately.

One patient in the Trucut group developed right subcostal pain and an isotope scan suggested an intrahepatic haematoma; this resolved with conservative management. No other complications were observed.

Table 1 *Histological diagnoses*

Diagnostic group	*No of Surecut specimens*	*No of Trucut specimens*
Cirrhosis	12	18
Fibrosis	6	14
Steatosis	11	7
Tumour	4	4
Hepatitis (acute)	4	3
(chronic)	6	7
Other (including normal)	4	3
Total	47	56

Table 2 *Histopathological assessment of biopsy specimens*

	No	*Category*	*Biopsy after fixation*			*No of fragments in block ± SD*	*Biopsy on glass slide*			
			No of fragments ± SD	*Length ± SD (mm)*	*Weight ± SD (mg)*		*No of fragments ± SD*	*Length ± SD (mm)*	*Length of longest fragment ± SD (mm)*	*Total area ± SD (mm²)*
	12	Cirrhotic	1·67 ± 1·44	20·17 ± 6·83	30·97 ± 17·5	2·0 ± 1·35	3·5 ± 2·32	16·05 ± 6·32	10·45 ± 6·57	15·19 ± 8·07
Surecut	35	Non-cirrhotic	1·63 ± 1·02	23·4 ± 9·5	36·6 ± 19·2	2·23 ± 1·70	3·13 ± 2·41	18·8 ± 7·24	12·5 ± 6·99	17·83 ± 8·14
	47	Overall	1·64 ± 1·13	22·6 ± 9·0	35·2 ± 18·7	2·174 ± 1·61	3·23 ± 2·39	18·1 ± 7·1	12·0 ± 6·9	17·16 ± 8·12
	18	Cirrhotic	1·17 ± 0·52	20·67 ± 4·54	29·03 ± 7·52	1·33 ± 0·60	1·778 ± 1·06	15·62 ± 3·74	13·28 ± 5·06	15·13 ± 4·23
Trucut	38	Non-cirrhotic	1·26 ± 0·59	16·0 ± 4·98	21·5 ± 8·74	1·49 ± 1·01	1·63 ± 1·31	12·8 ± 4·34	10·8 ± 4·81	12·73 ± 4·97
	56	Overall	1·23 ± 0·57	17·5 ± 5·2	23·9 ± 8·9	1·436 ± 0·88	1·68 ± 1·16	13·7 ± 4·1	11·6 ± 4·9	13·50 ± 4·76
p value for overall groups			NS	$p < 0·005$	$p < 0·001$	$p < 0·01$	$p < 0·01$	$p < 0·001$	NS	$p < 0·01$

Table 3 *Overall quality of biopsy specimens*

	Quality of biopsy specimens					*Artefacts*				
	Excellent	*V good*	*Good*	*Fair*	*Poor*	*0*	+	++	+++	++++
Surecut	1	12	11	13	10	3	10	21	9	4
Trucut	9	17	18	7	5	14	20	14	8	0
	$\chi^2 = 15·69$	$p < 0·01$				$\chi^2 = 15·24$	$p < 0·01$			

Discussion

Surecut needle biopsies were significantly longer and heavier than Trucut specimens before processing and the total length and total area available for examination after processing were greater. Unfortunately processing of Surecut specimens resulted in considerable fragmentation and the length of the largest fragment obtained with either needle, probably the most important factor in reproducibility of diagnosis,[4] was not significantly different. Artefacts (crushing and bending of the tissue) were significantly more frequent with the Surecut needle and this, together with the higher incidence of fragmentation, influenced the subjective assessment of the histopathologist, who found Trucut specimens significantly better for assessment of liver architecture and cytological detail. The great majority of specimens, obtained by both needles were satisfactory for diagnostic purposes. It is interesting to note that the specimens from cirrhotic liver were no more liable to fragmentation than the others.

In retrospect we found that fragmentation of Surecut specimens was due to a combination of three factors: firstly, specimens appeared to be accompanied by larger amounts of blood and they stuck more firmly to the mounting paper, making it more difficult to separate them without damage after fixation. Secondly, they were thinner and became more fragile when they hardened after fixation and processing. Lastly, some specimens had fixed in a wavy rather than straight position and it was considerably more difficult to obtain a complete section of the specimen in any plane, even after careful embedding, so that more fragments appeared on the slide than in the block (pseudofragmentation). Some of these problems could probably be reduced by using a wider bore needle, but others such as crush artefact and difficulty in mounting a straight specimen are related to the use of suction and pressure to obtain the specimen and remove it from the needle. Although it is often said that fine bore needles are safer, there is no factual evidence to support this contention.[2]

There are a number of points in favour of the Surecut needle. It is probably easier to use, particularly for the occasional operator, and the time the needle stays in the liver is shorter than for the Trucut. This is an obvious advantage if the patient is not fully co-operative. The weight and volume of the liver tissue obtained is greater and this should increase the chances of detecting tumours, granulomata and other focal lesions. Furthermore, the fluid which is aspirated with the liver may be sent for cytological examination, which may slightly increase the diagnosis rate in liver cancer.[5] Lastly, the Surecut needle is slightly cheaper at present.

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