‘Tru-Cut’ needle biopsy of the liver: importance of the correct technique

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Summary: In order to determine which technique would provide adequate tissue for histological examination when the ‘Tru-Cut’ needle is used for liver biopsy, the livers of cadavers were biopsied by a single operator, under direct vision, using a ‘Tru-Cut’ needle. The modified breast biopsy technique either preceded or followed one of two alternative methods, one of which was recommended by the manufacturer, in a random manner. Thereafter, the biopsies were repeated using the alternative sequence.

The mean length of the liver biopsy specimens that were obtained using the modified breast biopsy technique was 16.3 mm (range: 8–20 mm). The corresponding figures for the manufacturer’s method were 7.7 mm (range: 2–14 mm) and for the third technique were 2.7 mm (range: 0.5–8 mm). Three of the 40 specimens (7.5%) obtained using the latter technique fragmented when placed in formalin; this did not occur in any of the 40 specimens taken using the modified breast biopsy technique.

This investigation indicates that the modified breast biopsy technique should be used when ‘Tru-Cut’ needle biopsy of the liver is performed. This provides specimens which are adequate for histological diagnosis. In addition, the safety of liver biopsy, which is compromised by poor technique, is improved. The alternative methods, including that recommended by the manufacturer, must be avoided.

Introduction

Percutaneous needle biopsy of the liver is a useful method for detecting the presence and nature of hepatic disease. The specimens obtained need to be of an adequate length for histological diagnosis because pathology is often missed due to the small size of the sample.¹

The ‘Tru-Cut’ needle² is used for this purpose at King Edward VIII Hospital, Durban. One of us (BM) recently discovered that the technique that he had been using for liver biopsy was a modification of the one recommended by the manufacturer for breast biopsy, and that the method suggested by them² was one of two he had discouraged colleagues from using because the length of specimens obtained was inadequate.

In view of the importance of the length of the liver tissue specimen submitted for histological examination, a study comparing the three techniques was conducted in cadavers.

Patients and methods

‘Tru-Cut’ biopsy techniques

The ‘Tru-Cut’ needle consists of an inner solid needle, the obturator and an outer hollow needle, the cannula. The obturator has a pointed end for tissue penetration and immediately behind this is a notch for the biopsy specimen. The cannula serves as a cutting sheath.

The manufacturer of the ‘Tru-Cut’ needle² recommends one technique for what they term ‘usual biopsy procedures’ and another for breast biopsy.² In both cases, preparation of the biopsy site, adequate anaesthesia and incision of the skin with a scalpel is advised. The latter step is necessary because the needle is not designed to puncture the skin. Thereafter, if a breast biopsy is desired, the obturator is retracted fully to cover the specimen notch (i.e. the needle is closed), the T-shaped cannula handle is held firmly while the device is inserted up to the tissue to be biopsied, and the obturator advanced as far as possible. Finally, the obturator is held firmly to stabilize the assembly, the cannula handle (outer sheath) is advanced to cut the tissue which has prolapsed into the specimen notch, and the device withdrawn (Technique 1) (Figure 1).

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Figure 1 Schematic representation of the breast biopsy technique using the 'Tru-Cut' needle.

For the usual biopsy procedures, the manufacturer recommends that with the obturator fully retracted and held firm, the needle is inserted into the tissue being biopsied, the cannula is retracted (to expose the specimen notch) and then advanced (to cut the tissue which has prolapsed into the specimen notch), and the assembly withdrawn (Technique 2) (Figure 2). Another possible technique involves inserting the closed needle into the liver, and advancing and then retracting the obturator (Technique 3) (Figure 3).

In the present study, one modification was made to the breast biopsy technique – the needle was inserted into, rather than up to, the liver; the rest of the procedure was unchanged.

Study design

Twenty adults who had died of non-natural causes were studied after the liver had been exposed at autopsy and found to be normal macroscopically. Each liver was biopsied four times, under direct vision, using one 'Tru-Cut' needle. The modified breast biopsy technique (technique 1) either preceded or followed technique 3 in a random manner. Thereafter, the biopsies were repeated using the alternative sequence. All biopsies were carried out by a single operator. The length of the specimens was measured immediately after each biopsy, and after they had been immersed in formalin. The latter step was taken to determine if fragmentation of the specimens occurred with either technique. Technique 1 was compared to technique 2 in a similar manner in 10 livers. These specimens were not placed in formalin.

Results

The results are presented in Tables I and II. The mean length of the liver biopsy specimens that were obtained using the modified breast biopsy technique was 16.3 mm (range: 8–20 mm). The corresponding figure for technique 3 was 2.7 mm (range: 0.5–8 mm). Three of the 40 specimens (7.5%) obtained using the latter technique fragmented when placed in formalin; this did not occur in any of the 40 specimens taken using the alternative method (Table I). The average length of specimens using technique 2 was 7.7 mm (Table II).

Discussion

The diagnostic yield of percutaneous needle biopsy of the liver is influenced by the length of the specimen;¹ diagnostic accuracy improves as increasing amounts of tissue become available for histological examination.³ The present investigation indicates that, when the 'Tru-Cut' needle is used for liver biopsy, the modified breast biopsy technique should be used, because the specimens obtained were much longer and adequate for histological diagnosis; the average length was 16.3 mm. The shortest specimen obtained measured 8 mm and none of the specimens was fragmented. These data lend support to the recommendation of a number of workers that this technique should be used for liver biopsy.^{4,5}

However, the limitations of the alternative methods, including that recommended by the manufacturer, have not been emphasized in the

Figure 2 Schematic representation of 'usual' biopsy technique using the 'Tru-Cut' needle.

Table I Length of liver biopsy specimens obtained with a 'Tru-Cut' needle using Techniques 1 and 3

Patient no.	Length of specimens (mm)*			
	Technique 1		Technique 3	
	First biopsy	Second biopsy	First biopsy	Second biopsy
1	18 (17)	20 (19)	3 (3)	3 (2)
2	20 (20)	15 (15)	1 (1)	1 (1)
3	19 (19)	8 (8)	2 (2)	2 (2)
4	16 (16)	13 (12)	1 (1)	4 (4)
5	13 (12)	12 (12)	1 (1)	2 (2)
6	13 (12)	12 (11)	2 (2)	5 (5)
7	20 (20)	16 (15)	1 (1)	1 (1)
8	20 (20)	10 (10)	1 (1)	1 (1)
9	13 (12)	14 (13)	3 (3)	4 (2,1,1)†
10	10 (10)	14 (14)	1 (1)	3 (3)
11	8 (7)	11 (11)	1 (1)	1 (1)
12	20 (20)	12 (12)	8 (8)	3 (3)
13	20 (20)	20 (20)	3 (3)	4 (3)
14	20 (20)	14 (14)	3 (3)	5 (5)
15	20 (20)	11 (11)	4 (2,1,1)†	4 (3)
16	15 (15)	20 (20)	1 (1)	3 (3)
17	17 (17)	20 (20)	3 (3)	1 (1)
18	19 (19)	18 (18)	6 (5)	4 (4)
19	20 (20)	16 (16)	3 (3)	2 (1,0.5,0.5)†
20	20 (20)	18 (18)	5 (5)	3 (2)
Mean	17.1 (16.8)	14.7 (14.5)	2.7 (2.5)	2.8 (2.4)
s.d.	3.8 (4.1)	3.7 (3.7)	1.9 (1.9)	1.4 (1.4)

*Figures in brackets indicate the length of specimens after immersion in formalin. †Indicates fragmented specimen.

literature. The average length of specimens obtained with technique 2 (cannula retracted and advanced) and technique 3 (obdurator advanced and retracted) was 7.7 mm and 2.7 mm respectively. The longest specimen obtained with tech-

nique 3 measured 8 mm. In addition, 7.5% of specimens were fragmented. It is not only diagnostic accuracy of the procedure that is compromised by poor technique, but also safety. Hegarty and Williams have stated that

Figure 3 Schematic representation of an 'alternative' biopsy technique using the 'Tru-Cut' needle.

Table II Length of liver biopsy specimens obtained with a 'Tru-Cut' needle using Techniques 1 and 2

Patient no.	Length of specimens (mm)			
	Technique 1		Technique 2	
	First biopsy	Second biopsy	First biopsy	Second biopsy
1	11	16	4	6
2	15	16	2	11
3	20	18	8	10
4	18	14	11	11
5	15	19	12	2
6	15	17	3	3
7	20	18	10	5
8	15	15	11	6
9	18	20	14	7
10	16	18	5	12
Mean	16.3	17.1	8.0	7.3
s.d.	2.8	1.9	4.2	3.5

successful liver biopsy without complications demands good technique and that inadequate specimens and serious complications are the hallmarks of the inexperienced operator.⁴ Thus, the importance of the correct technique during needle biopsy of the liver cannot be stressed enough, especially in developing countries where the procedure is carried out by relatively junior medical staff in general medical or surgical wards.

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