ORIGINAL ARTICLE

AN AUDIT OF LENGTH OF BONE MARROW TREPHINE BIOPSIES AT A TERTIARY CARE HOSPITAL

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Background: Bone marrow trephine biopsy is a well established minor surgical procedure for the inspection of bone marrow usually done along with bone marrow aspiration. The objective of this study was to evaluate the length of trephine biopsies and the rate of positivity for diagnosis as well as unfit biopsies in various length ranges. **Methods:** This retrospective study was conducted at Fauji Foundation Hospital and Foundation University Medical College Rawalpindi from Jan 2007 to Dec 2009. A total of 394 trephine biopsy reports were collected and reviewed. The criterion for adequate trephine biopsy was ≥1.5 Cm. The biopsies were divided into four groups according to length, i.e., group-1: ≥1.5 Cm, group-2: 1–1.4 Cm, group-3: 0.5–0.9 Cm, and group-4: <0.5 Cm. The adequacy of trephine biopsy length and rate of positive diagnosis as well as unfit biopsies were compared. **Results:** Total 394 trephine biopsies were reviewed. Group-1 included 88 biopsies and 87 (98.9%) had positive diagnosis. Group-2 included 137 biopsies and 133 (97.1%) had positive diagnosis. Group-3 included 99 biopsies and 91 (92%) had positive diagnosis. Group-4 included 70 biopsies and 57 (81.4%) had positive diagnosis. There was no significant difference between group-1 and group-2 for the rate of positivity of diagnosis (p=0.65). In group-1, 1 (1.1%) was unfit for evaluation, in group-2, 4 (2.9%) were unfit, in group-3, 8 (8%) were unfit, and in group-4, 13 (18.5%) were unfit for evaluation. Total 26 trephine biopsies were unfit for evaluation, out of which 13 (50%) belonged to group-4. Trephine biopsies that were unfit for evaluation were 4 (4.9%) in 2007, 17 (10.5%) in 2008, and 5 (3.3%) in 2009. **Conclusion:** Although 22.3% biopsies were of recommended length there was no significant difference in rate of positive diagnosis between biopsies of ≥1.5 Cm and 1–1.4 Cm.

Keywords: Audit, Bone marrow trephine biopsy

INTRODUCTION

The quality of service in a laboratory needs to be assessed and improved so that an accurate diagnosis is given on time. An audit of various laboratory tests and procedures is very useful in this regard.[1]

Bone marrow trephine biopsy is a well established minor surgical procedure for the inspection of bone marrow usually done along with bone marrow aspiration. It is one of the most important diagnostic procedures for evaluation of haematological and non haematological disorders.[2] Bone marrow examination is also required for staging of lymphoma as involvement of bone marrow indicates advance stage and this has a bearing on treatment.[3] Since bone marrow aspiration may either be normal or diluted so trephine biopsy is mandatory in staging of lymphoma.[4] It has been found that trephine biopsy is superior to aspiration in cases of metastasis of solid organ tumours and lymphomas.[5] Trephine biopsy has a major role in assessing the cellularity, pattern of infiltration (focal or diffuse) and is helpful when there is a dry tap on aspiration due to fibrosis or infiltration.[6,7] Trephine biopsies are also used for immunohistochemical and molecular studies, and this has added a new dimension to diagnostic evaluation of haematological disorders including leukaemias, myelodysplastic syndromes and lymphomas involving the bone marrow.[8]

Ideally a trephine biopsy is taken from posterior iliac crest and bilateral sampling improves tumour detection as compared to sample taken from single site.[9] Different biopsy needles are used for trephine biopsy though Jamshidi and Islam needles are the most popular.[10,11] If bone marrow aspiration is found inadequate, imprints should be taken from the biopsy at the time of sampling.[12] It has been found that trephine biopsy shrinks about 25% during processing.[13] According to World Health Organization (WHO) recommendation the minimum adequate length is ≥1.5 Cm.[14]

The objective of our study was to evaluate the length of trephine biopsies and the rate of positivity for diagnosis as well as unfit biopsies in various length ranges.

MATERIAL AND METHODS

This was a retrospective study on the adequacy of length and rate of positive diagnosis of trephine biopsy samples which were performed at Fauji Foundation Hospital Rawalpindi and were sent to Histopathology Department Foundation University Medical College Rawalpindi for processing and evaluation. All trephine biopsies done from Jan 2007 to Dec 2009 were included in the study.

Details regarding procedure and processing of all bone marrow aspirations and trephine biopsies were collected from previous laboratory records. All trephine

biopsies were taken from posterior superior iliac spine by haematologist/residents using disposable trephine biopsy needles (a modified type of Jamshidi needle made by TSK). The biopsies were placed in 10% formal saline and sent to Histopathology department, Foundation University Medical College where it was decalcified in 5% nitric acid, processed in automatic tissue processor for 18–24 hours. After embedding in paraffin, 3–4 micron thick sections were cut and stained with hematoxylin and eosin for routine examination.

The criterion for adequate length of trephine biopsy was ≥1.5 Cm as recommended by WHO.[13] Trephine biopsies were divided into four groups according to length (group-1: ≥1.5 Cm, group-2: 1–1.4 Cm, group-3: 0.5–0.9 Cm, and group-4: <0.5 Cm). These groups were compared for the rate of positivity of diagnosis. Percentage of trephine biopsies that were unfit for evaluation was assessed in various groups as well as year-wise.

RESULTS

Data of 394 trephine biopsies were reviewed. The percentage of trephine biopsies in different length ranges was calculated. Eighty-eight (22.3%) biopsies were of recommended length, i.e., ≥1.5 Cm while remaining 306 (77.7%) were less than the recommended length. Group-2 included maximum number of the trephine biopsies (137, 34.8%). The rate of positivity for diagnosis was 98.9% in group-1, 97.1% in group-2, 92% in group-3 and 81.4% in group-4 (Table-1). Twenty-six (6.5%) biopsies during three years were reported as unfit for evaluation (Table-2). Half (13/26) of these unfit biopsies had length <0.5 Cm (group-4).

Table-1: Trephines unfit or positive at different length ranges

Group	Length (Cm)	Total n (%)	Unfit n (%)	Positive n (%)
1	>1.5	88 (22.3)	1 (1.1)	87 (98.9)
2	1–1.4	137 (34.8)	4 (2.9)	133 (97.1)
3	0.5–0.9	99 (25.10)	8 (8)	91 (92)
4	<0.5	70 (17.8)	13 (18.5)	57 (81.4)

Table-2: Year-wise percentage of biopsies unfit for evaluation

Year	Total	Unfit	Percent
2007	81	4	4.9
2008	162	17	10.5
2009	151	5	3.3

DISCUSSION

The main indications for trephine biopsy in our patients are haematological malignancies, Myeloproliferative neoplasms and tumours of Breast, Lung, and Prostate etc. It is also done for investigation of cyopenias as well as pyrexia of unknown origin.

According to WHO[14], whatever the indication may be, the recommended minimum adequate length for trephine biopsies is ≥1.5 Cm. Another study has also recommended a length of ≥1.5 Cm.[13] Our study showed 88 (22.3%) biopsies are of recommended length and 98.9% of these were adequate for evaluation. Similar results have been reported in another study which showed 19 (24%) biopsies were of recommended length.[15] According to this criterion, in our hospital 306 (77.7%) trephines were below the recommended length but most of them had sufficient bone marrow core for evaluation. This has also been reported by Reid MM and Roald B who reviewed trephine specimens from 25 different centres and submitted that 0.5 Cm trephine biopsy after processing having sufficient core is adequate for reporting.[16]

Campbell *et al* have reported that the rate of positivity for detection of different tumours increases with increase in the length of trephine biopsy and suitable amount of haemopoetic core.[17] This is supported by our study as well, as the rate of positivity increases with increasing length of trephine biopsies. The maximum biopsies that yielded positive diagnosis even below the recommended length were measuring 1-1.4 Cm (97.1% positivity). There was no significant difference (p=0.65) for the rate of positivity for diagnosis between group-1 (≥1.5 Cm) and group-2 (1–1.4 Cm).

A total of 26 (6.5%) trephine biopsies were unfit for evaluation. Half (13) of these biopsies were below 0.5 Cm (group-4). The main reasons were insufficient length, presence of cartilage, skeletal muscles, periostium, crushing effect, scanty haemopoietic tissue and clotted blood. Other studies have also reported similar findings regarding trephine biopsies that were unfit for evaluation.[10,18,19]

Proper training and motivation is required for performing the biopsies of adequate length.[20,21] As in our study, in 2007, consultant haematologist was performing the bone marrow trephine, the percentage of trephine biopsies, unfit for evaluation was only 4.9%. Expertise varied amongst different performers. Thus in 2008 the percentage of trephine biopsies, unfit for evaluation was high (10.5%). In 2009 a low rate, (3.3%) of unfit trephine biopsy was seen because of better experience and practice.

CONCLUSION

Our study showed that 22.3% trephine biopsies were of recommended length, i.e., ≥1.5 Cm with 98.8% positivity of diagnosis. However biopsies measuring 1–1.4 Cm also had comparable results (97.1%).

RECOMMENDATION

1. The haematologists should review their technique and make an attempt to improve adequacy of trephine biopsy length.
2. Pathologists should give feedback about inadequacy of specimen.
3. The audit should be repeated every year.

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