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Outcome of Ultrasound Guided Fine Needle Aspiration Cytology (FNAC) and Cell Block in Pediatric Abdominopelvic Masses

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ABSTRACT
Pediatric abdominopelvic masses comprises of a variety of conditions including inflammatory conditions, infections and malignancies. It is very crucial to diagnose and differentiate these conditions for the definitive treatment. USG guided FNAC is a safe, rapid, less expensive technique for cytological diagnosis with no exposure to ionizing radiation specially in pediatric patients. To evaluate the outcome of USG guided FNAC and cell block in pediatric abdominopelvic masses. This retrospective study was conducted in Department of Radiodiagnosis at Kidwai Memorial Institute of Oncology for a period of 1 year (May 2021-2022). Fifty pediatric patients with abdominopelvic masses were included in this study. USG guided FNAC with cellblock was done from abdominopelvic masses and cytological reports were reviewed for the adequacy of sample. Among 50 patients 32 were males, 18 were females and most were less than 10 years old. About 47 of 50 (94%) USG guided FNAC were successful and obtained adequate material for cytological diagnosis. About 45 of 50 (90%) cell block samples had adequate for cytomorphological diagnosis. Most common site of FNAC was kidneys followed by liver and adrenals. Most common pathologies were Wilms tumor followed by Hepatoblastoma and Neuroblastomas. FNAC alone had less sensitivity in differentiating the small round tumors as Neuroblastoma, Hepatoblastoma and Wilms tumor, whereas FNAC with cell block can differentiate various small round cell tumors. USG Guided FNAC is very simple, safe and minimally invasive diagnostic technique without ionizing radiation. FNAC with cell block can be a good alternative for needle biopsy or diagnostic laparotomy in pediatric population with least complications. If initial FNAC and cell block sample is inadequate then needle biopsy can be useful second line investigation for pathological diagnosis.

INTRODUCTION

Paediatric abdominopelvic masses have a broad differential diagnosis that encompasses both benign and malignant entities[1]. Pediatric tumors differ markedly from adult tumors in their nature, distribution and prognosis[2]. Although only 2% of all malignant tumors occur in infancy and childhood, cancer is the leading disease related cause of death among children in the world[3]. Therefore it is very crucial to diagnose and differentiate them which aids in definite treatment of the patient. Ultrasonography (USG) guided fine needle aspiration cytology (FNAC) is most favoured and well-established diagnostic technique for evaluating various deep seated neoplastic and non-neoplastic mass lesions in paediatric patients[4]. USG has the advantage of being easily available, rapid, less expensive and safe with no exposure to ionizing radiation[5].

In a majority of cases, lesions can be clearly visualized and localized by ultrasound and the samples can be obtained by ultrasound guided fine needle aspiration (FNA) which evades the use of more invasive procedures like diagnostic laparotomy[4]. Cell blocks prepared from residual fine needle aspiration (FNA) material helps in better morphologic assessment and contribute to establish a more definitive cytopathologic diagnosis[6]. In addition cell block also provides sample for tests like immunohistochemistry (IHC) and fluorescence in situ hybridization (FISH) which would help in the definitive diagnosis. FNAC is a safe, minimally invasive rapid procedure with good patient acceptance and low morbidity[7]. Therefore, this study aims to evaluate the outcome of ultrasound guided fine needle aspiration in pediatric abdominopelvic lesions.

Aims and objectives:

- To evaluate the role of FNAC and cell block in pediatric abdominopelvic masses
- To evaluate the outcome of USG guided FNAC and cell block of paediatric abdominopelvic masses
- To assess the usefulness of cell block as a complimentary diagnostic material in the morphologic evaluation of the lesions

MATERIALS AND METHODS

Retrospective study conducted at Department of Radio Diagnosis, Kidwai Memorial Institute of oncology, Bangalore. As it was a Retrospective study ethical clearance was waved off by Institutional Ethical Committee.

The duration of study was one year from May 2021-2022.

Fifty pediatric patients referred to department of Radiodiagnosis for USG guided FNAC and cell block were included in the study.

Inclusion criteria: Paediatric patients with abdomino pelvic masses.

Exclusion criteria:

- Uncorrectable severe coagulopathy
- Patients who are unable to lie down for FNAC
- Uncooperative pediatric patients who cannot be sedated
- FNAC from sites other than abdominopelvic organs

Methods: Pediatric patients with clinically and/or radiologically detected intra-abdominal masses who were referred to Department of Radio Diagnosis for USG Guided FNAC were the subjects of this study. Picture Archiving Communication System (PACS) Database was searched for USG Guided FNAC of abdominopelvic masses. About 228 USG Guided FNAC images reviewed. For 178 FNAC were excluded as it was done in Adult patients (More than 18 years) or it was done from sites other than abdominopelvic organs. Fifty pediatric patients who underwent USG guided FNAC with cellblock from abdominopelvic lesion were considered for the study.

The site of the lesions included liver, kidney, adrenals, retroperitoneum and pelvic masses. Patients with severe coagulopathy were considered as contraindications for FNAC in view of possible serious complications. The procedure of FNA was explained to the parent/guardian seeking an informed consent. The mass under investigation was evaluated by USG and the path of FNA providing the safest and easiest access to the lesion was chosen. About 24 out of 50 patients were sedated using Ketamine 1 mg kg^{-1} and Midazolam 0.1 mg kg^{-1} by the Pediatrician as the children were uncooperative for the procedure. About 21 or 22 g needle, 21 g IV canula, 21 g spinal needle (90 mm length) were chosen for FNAC depending upon the depth of the lesion from the skin. Under aseptic precautions, FNAC was performed with needle/canula attached to a 10 mL disposable syringe. For Cell block all macroscopically visible tissue fragments in the aspirated material were collected in 10cc syringe in single puncture and sent for analysis. Each aspirate was smeared on an average 3-4 slides and 2 slides were immediately wet fixed in 95% alcohol fixative. The aspirate smears and cell block sections were sent for evaluation and the final cytomorphological diagnosis was made. The adequacy of FNAC alone and FNAC with cell block was evaluated. Medical records of patients were reviewed for procedure related complications and their management.

RESULTS

Among the 50 patients, 32 were males and 18 females and most were in first decade of life. 94% FNACs (47 out of 50 FNACs) were successful and

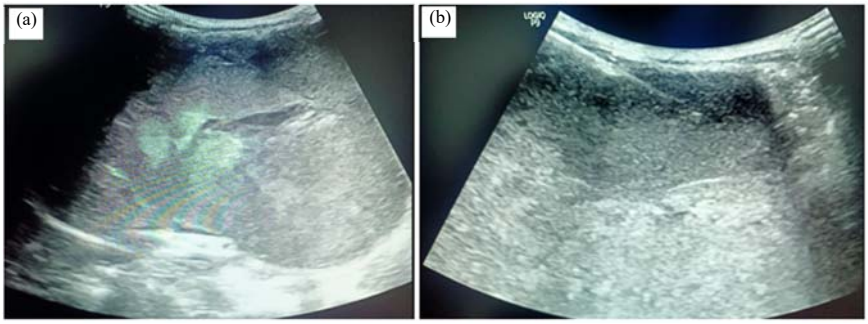

Fig. 1: 1-year-old male child with hypoechoic mass in the right lumbar region

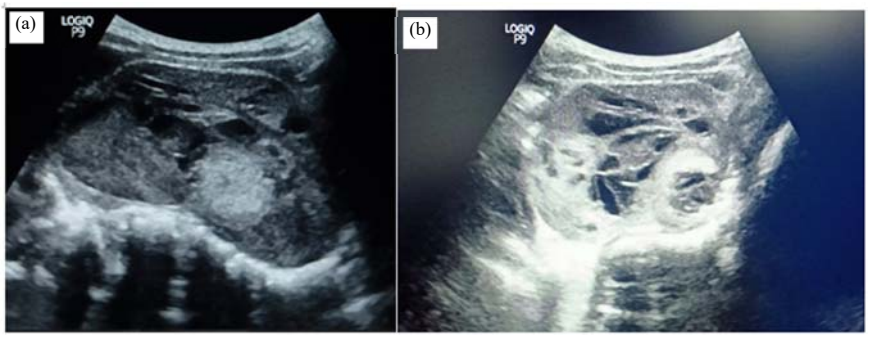

Fig. 2: 4-year-old female child with solid cystic lesion in the presacral region

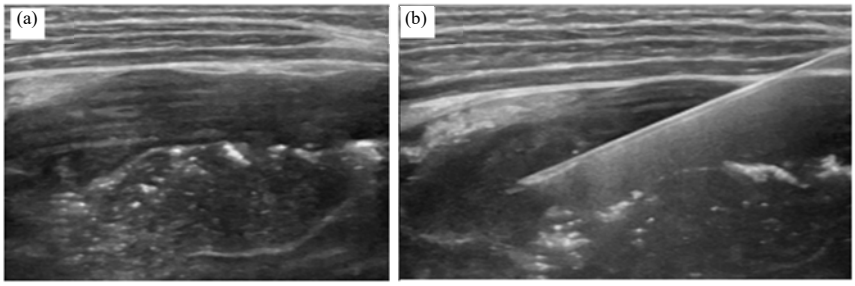

Fig. 3: 10 year female with diffuse hypoechoic bowel was thickening

Table 1: Outcome of FNAC

Pathology	Percentage
Malignant small round cell tumors	40
Hepatoblastoma	22
Wilms tumor	24
Neuroblastoma	6
No significant material	6
Others	2

obtained adequate material. 6% FNAC (3 out of 50 FNACs) were unsuccessful and showed no significant material/paucicellular smear (Table 1).

90% cell blocks (45/50) were successful and obtained adequate material. 10% cell blocks (5/50) were unsuccessful and showed no significant material for cell block. FNAC suggestive of wilms tumor (Table 2).

Figure 1 shows FNAC shows malignant small round cell tumor.

Table 2: Outcome of cellblock

Pathology	Percentage
Hepatoblastoma	28
Wilms tumor	32
Neuroblastoma	28
No significant material	10
Other	2

Figure 2 shows FNAC and cell block shows Ganglioneuroblastoma.

Figure 3 shows FNAC suggestive of Lymphoma.

DISCUSSIONS

A total of 50 cases of pediatric abdominopelvic masses underwent FNAC+cell block in a tertiary referral Oncology centre for a period of 1 year. The age range was from 10 months to 14 years. Most of the paediatric patients were less than 10 years of age. FNAC were performed with ultrasound (GE logic P9

series Machine) using a 20-22 gauge needle attached to a 10 mL disposable plastic syringe. For renal and adrenal masses, a posterolateral approach was used. However, the best approach for FNAC was selected on a case-to-case basis, dependent on the location and extent of the tumor. In each case, key clinical parameters such as age and radiological diagnosis were documented. About 47 out of 50 USG guided FNAC sample were adequate (94% success rate) and 3 out of 50 were inadequate (6% failure rate). The failure of FNAC was due to inadequate sample, hemorrhagic smears and suboptimal quality of slide preparation. 2 cases had to undergo repeat FNAC and cell block and 1 case had to undergo biopsy for the diagnosis. 90% (45 out of 50) samples were adequate cell block samples. 10% (5 out of 50) cases did not have adequate sample for cell block as the lesions had calcifications/fibrous tissue and few of the paediatric cases were not cooperative so the needle had to be withdrawn soon after FNAC.

The most common outcome on FNAC was malignant small round cell tumors and the most common outcome after FNAC+cell block was Wilms tumor. The most common outcome of FNAC in a study conducted by Viswanathan *et al.*[8] was Wilms tumor. Kidneys were most common site of malignancy followed by liver and adrenals.

In a Study conducted by Melese and Getaneh[9] the most common organ for FNAC was liver (45.9%) followed by omentum (12.2%) and Malignancy was detected in 70.3% cases. The diagnostic yield for FNAC of solid abdominal masses was 74.4% as compared to True cut biopsy (95.3%) in a study conducted by O'Connell *et al*.[10].

Many of the Patient's complained of mild pain at the site of puncture following the procedure which resolved on its own after few hours. About 2 out of 50 patient complains of persistent pain even after 24 hrs which resolved with analgesics. About 1 out of 50 patient complained of fever post-procedure however, there was no evidence of local site tenderness/ecchymosis/heamatoma hence could not be related to the procedure. Fever resolved after initiation of antibiotics and antipyretics. There were no other complications such as hematoma/ ecchymosis/fever related to the procedure were observed.

The advantage of USG guided FNAC are cost effectiveness, real time image, no radiation hazard, easy to perform, dynamically evaluation of the vessels, localization of the target, no hospitalization etc. Disadvantage being inadequacy of the sample in very few cases.

The limitations of study included smaller sample size, Retrospective study hence there can be chances of selection bias. The study was conducted in tertiary oncology centre hence the results cannot be implied to general population.

FNAC and cell block can be used as a good diagnostic tool specially in the paediatric cases who are not cooperative for procedures like biopsies and cell block sample can be obtained in a single puncture with FNAC. In addition sample can also be obtained for cytogenetics from the single puncture.

CONCLUSION

Ultrasound guided fine needle aspiration cytology is very versatile, simple, economical and safe technique with potential high diagnostic yield. Though biopsy is considered better than FNAC for the diagnosis, in paediatric age group FNAC with cell block can be a good alternative with similar diagnostic accuracy and least complications. Open biopsies/USG guided biopsy can be avoided in selected cases where biopsies are contraindicated or FNAC and cell block sample is adequate for the diagnosis and treatment specially in a paediatriccases. If the initial FNAC is inadequate then core needle biopsy can be useful second-line method of pathological diagnosis.

REFERENCES

1. Kim, H.H.R., N.C. Hull, E.Y. Lee and G.S. Phillips, 2022. Pediatric abdominal masses. Radiol. Clin. North Am., 60: 113-129.
2. Shirian, S., Y. Daneshbod, S. Haghpanah, B. Khademi, F. Noorbakhsh, A. Ghaemi and Z. Mosayebi, 2017. Spectrum of pediatric tumors diagnosed by fine-needle aspiration cytology. Medicine, Vol. 96, No. 6. 10.1097/md.0000000000005480
3. Li, J., T.D. Thompson, J.W. Miller, L.A. Pollack and S.L. Stewart, 2008. Cancer incidence among children and adolescents in the united states, 2001-2003. Pediatrics, 121: e1470-e1477.
4. Sumana, B.S., 2015. Ultrasonography guided fine needle aspiration cytology with preparation of cell blocks in the diagnosis of intra-abdominal masses. J. Clin. Diagn. Res., Vol. 9, No. 8. 10.7860/jcdr/2015/16490.6869
5. Porter, B., W. Karp and L. Forsberg, 1981. Percutaneous cytodiagnosis of abdominal masses by ultrasound guided fine needle aspiration biopsy. Acta Radiol. Diagn., 22: 663-668.
6. Gupta, N., A. Sekar and A. Rajwanshi, 2015. Role of fnac, fluid specimens, and cell blocks for cytological diagnosis of lung cancer in the present era. J. Cytol., 32: 217-222.
7. Prathima, S., T. Suresh, M.H. Kumar and J. Krishnappa, 2014. Fine needle aspiration cytology in pediatric age group with special reference to pediatric tumors: A retrospective study evaluating its diagnostic role and efficacy. Ann. Med. Health Sci. Res., 4: 44-47.

8. Viswanathan, S., S. George, M. Ramadwar, S. Medhi, B. Arora and P. Kurkure, 2009. Evaluation of pediatric abdominal masses by fine-needle aspiration cytology: A clinicoradiologic approach. Diagn. Cytopathol., 38: 15-27.
9. Melese, S.S. and F.B. Getaneh, 2021. Yield of ultrasound guided fine-needle aspiration of intraabdominal masses and lymph nodes: A prospective cross-sectional study. Ethiop. J. Health Sci., 31: 1241-1246.
10. O'Connell, A., F. Keeling, M. Given, M. Logan and M. Lee, 2008. Fine-needle trucut biopsy versus fine-needle aspiration cytology with ultrasound guidance in the abdomen. J. Med. Imaging Radiat. Oncol., 52: 231-236.