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Image guided percutaneous splenic interventions

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Abstract

Aim: The objective of this study is to evaluate the efficacy and safety of image-guided percutaneous splenic interventions as diagnostic or therapeutic procedures.
Materials and methods: We performed a retrospective review of our interventional records from July 2001 to June 2006. Ninety-five image-guided percutaneous splenic interventions were performed after informed consent in 89 patients: 64 men and 25 women who ranged in age from 5 months to 71 years (mean, 38.4 years) under ultrasound ($n = 93$) or CT ($n = 2$) guidance. The procedures performed were fine needle aspiration biopsy of focal splenic lesions ($n = 78$) and aspiration ($n = 10$) or percutaneous catheter drainage of a splenic abscess ($n = 7$).
Results: Splenic fine needle aspiration biopsy was successful in 62 (83.78%) of 74 patients with benign lesions diagnosed in 43 (58.1%) and malignancy in 19 (25.67%) patients. The most common pathologies included tuberculosis (26 patients, 35.13%) and lymphoma (14 patients, 18.91%). Therapeutic aspiration or pigtail catheter drainage was successful in all (100%) patients. There were no major complications.
Conclusions: Image-guided splenic fine needle aspiration biopsy is a safe and accurate technique that can provide a definitive diagnosis in most patients with focal lesions in the spleen. This study also suggests that image-guided percutaneous aspiration or catheter drainage of splenic abscesses is a safe and effective alternative to surgery.

Keywords: Spleen; Image-guided; Fine needle aspiration biopsy; Catheter drainage

1. Introduction

Percutaneous image-guided interventional procedures such as fine needle aspiration (FNA) biopsy of focal lesions of intra-abdominal organs such as the liver, pancreas or lymphnodes or catheter drainage of intra-abdominal abscesses are now widely accepted to be safe and effective diagnostic or therapeutic techniques [1–5]. However, these interventional procedures are infrequently performed on the spleen as reflected by the comparative paucity of reports in radiology literature. The major reason for this lies in the relative rarity of splenic abscesses or focal lesions which need to be biopsied. Moreover, if a safer or more accessible lesion is present in another organ, many operators usually prefer to sample that rather than the splenic lesion. This is because of concerns regarding the potentially increased risk of complications, particularly hemorrhage with its associated mortality and morbidity due to the vascularity of the spleen [6–8]. A few small studies have advocated the usefulness of image-guided splenic FNA biopsy in the evaluation of both neoplastic and benign lesions [9–13] while others have reported on the efficacy and safety of percutaneous catheter drainage of splenic abscesses [12,14,15]. Image-guided percutaneous splenic interventions are frequently performed procedures at our institute. We therefore performed this retrospective study to evaluate the accuracy, efficacy and safety of image-guided percutaneous interventions of the spleen as a diagnostic or therapeutic tool.

2. Materials and methods

We performed a retrospective review of our interventional records of the last 5 years (July 2001–June 2006). In this period, 95 image-guided percutaneous splenic interventions were performed in 89 patients consisting of 64 men and 25 women ranging in age from 5 months to 71 years (mean age, 38.4 years). The procedures performed included fine needle aspiration biopsy of focal lesions in the spleen ($n = 78$) and therapeutic aspiration ($n = 10$) or percutaneous catheter drainage ($n = 7$) of a

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splenic abscess. Ninety-three procedures were performed under sonographic guidance with CT guidance used for only two cases in whom the lesion was not visualized on ultrasound. All procedures under sonographic guidance were performed using a 3.5 MHz or 5.0 MHz (in pediatric patients) transducer with a free hand technique. Coagulation parameters consisting of the international normalized ratio (INR), prothrombin time, prothrombin time index, activated partial thromboplastin time and platelet counts were obtained for each patient and corrected if found to be deranged prior to the procedure. The minimum acceptable levels were an INR less than 1.8 and a platelet count more than 50,000 ml^{-1}. The procedures were performed after platelet transfusions in cases with low platelet counts. A written informed consent was obtained from each patient after the nature of the procedure had been fully explained.

2.1. Fine needle aspiration biopsy

A total of 78 image-guided FNA biopsies were performed in 74 patients on an in-patient basis using a 22-G spinal needle. A repeat procedure was performed in four patients after the initial FNA biopsy was inconclusive. The most common clinical indication consisted of fever seen in 41 patients followed by loss of weight and appetite ($n = 7$) and abdominal pain ($n = 13$). Ten patients had a prior diagnosis of extrasplenic malignancy: lymphoma ($n = 3$), carcinoma breast ($n = 2$), bronchogenic carcinoma ($n = 2$), carcinoma cervix ($n = 1$), rhabdomyosarcoma ($n = 1$) and germ cell tumour of the testis ($n = 1$). Nine patients had some degree of immunosuppression: HIV positive ($n = 4$), type II diabetes mellitus ($n = 3$) and renal transplantation ($n = 2$). In one patient, FNA biopsy was performed to obtain a primary diagnosis when the splenic lesion was incidentally discovered during evaluation of a potential renal donor.

The spleen was the sole organ involved in most of the patients ($n = 69$), while focal lesions in the liver ($n = 2$) or enlarged retroperitoneal lymph nodes ($n = 3$) were also seen in five patients from which previous FNA biopsies had been inconclusive. The size of the splenic focal lesions ranged from 3 mm to 9 cm. Multiple hypoechoic lesions were present in 52 patients while a single hypoechoic lesion was identified in 20 patients. Multiple, ill defined hyperechoic lesions were seen in two patients. The most peripherally located lesion was selected for FNA biopsy in order to traverse the least amount of normal splenic parenchyma. The approach used was either subcostal or intercostal depending upon the location of the selected target lesion. The needle was inserted in suspended respiration under real time sonographic guidance ($n = 76$) or CT fluoroscopy ($n = 2$). One to four passes were obtained (mean, two passes) and the slides were immediately prepared and either air-dried or alcohol fixed by the attending cytologist who also assessed the adequacy of the aspirated material. The aspirate was also sent for appropriate cultures in cases of suspected infections.

2.2. Abscess aspiration/drainage

Image-guided therapeutic aspiration ($n = 10$) or percutaneous catheter drainage ($n = 7$) of a splenic abscess was performed in 15 cases on an in-patient basis. The most common clinical presentation in this group of patients was also fever seen in all the cases. Other symptoms included left hypochondrial pain ($n = 4$) and breathlessness ($n = 3$). Three patients were diagnosed cases of infective endocarditis while two patients had history of recent blunt abdominal trauma sustained within the last 8 weeks. One patient each were diagnosed cases of type II diabetes mellitus, chronic myeloid leukaemia in blast crises and acute pancreatitis with portal vein thrombosis, while one patient was a renal transplant recipient.

The size of the abscess on imaging ranged from 1.8–10.7 cm. The decision to perform a therapeutic aspiration versus catheter drainage was taken depending upon the size (<3 cm), location (central or peripheral) and approach to the lesion. In two patients, a therapeutic aspiration was performed rather than catheter drainage due to proximity of the abscess to the splenic hilum. All procedures were performed under real time sonographic guidance under local anaesthesia with intravenous conscious sedation in 10 patients. Therapeutic aspiration was done using a 18 or 20-G spinal needle. The Seldinger technique was used for placing the drainage catheters after initial diagnostic aspiration drew purulent material. A 8–10 F self-locking ($n = 3$) or standard pigtail ($n = 4$) catheters were placed over super-stiff guide wires with floppy tips. The samples obtained were sent for culture and sensitivity studies.

After the procedure, the patients were observed for at least 2 h in the intervention suite with monitoring of their vital signs. The skin entry site was also observed for any sign of bleeding or hematoma. A post-procedure ultrasound to detect any perisplenic fluid or hematoma was performed prior to transferring the patient to the ward.

Broad spectrum antibiotics were started in all cases of splenic abscess and changed if necessary after the culture reports were available. Standard catheter care was observed during follow up and the catheter output recorded [12,16]. An ultrasound was also performed every 24 h to evaluate resolution of the abscess cavity or detect any complications.

3. Results

3.1. Fine needle aspiration biopsy

A definitive cytological diagnosis was obtained on image-guided FNA biopsy in 62 (83.78%) of 74 patients. 43 (58.1%) patients had benign lesions with tuberculosis being the most common etiology seen in 26 (35.13%) patients. Interestingly, both cases with hyperechoic lesions on ultrasound were diagnosed to have tuberculosis on cytology. Of the immunosuppressed patients, all four HIV positive patients and one renal transplant recipient were found to have either caseating granulomas or necrotic material which was strongly positive for acid fast bacilli on cytology (Fig. 1a and b). The second renal transplant recipient was diagnosed as an acute abscess on cytology and responded to antifungal therapy. Of the three patients with diabetes mellitus, one patient each were found to have an acute abscess (Fig. 2a and b), Hodgkins disease and a vasoformative tumour on cytology. One patient diagnosed to have abdominal