ELSEVIER

Clinical Imaging 36 (2012) 19–23

CLINICAL IMAGING

Safety and efficacy of image-guided percutaneous biopsies in the diagnosis of gastrointestinal stromal tumors

Chih-Hua Yeh, Kuang-Tse Pan, Sung-Yu Chu, Chien-Ming Chen, Ming-Yi Hsu, Chien-Fu Hung, Jeng-Hwei Tseng*

Department of Medical Imaging and Intervention, Chang Gung Memorial Hospital at Linkou, and School of Medicine, Chang Gung University, Taoyuan, Taiwan

Received 2 February 2011; accepted 30 March 2011

Abstract

Background: After the invention of effective target agent therapy for gastrointestinal stromal tumors (GISTs), percutaneous biopsies may be indicated for unresectable diseases or before neoadjuvant chemotherapy. The purpose of this study was to evaluate the safety and efficacy of percutaneous biopsies for GISTs. **Material and methods:** Fifty-eight procedures of transluminal biopsies or image-guided percutaneous biopsies in 49 patients at our Institution from 1999 to 2010 were retrospectively reviewed. **Result:** Twenty-three transluminal biopsies, 20 ultrasonography-guided biopsies, and 15 CT-guided biopsies were performed. Failure rate was higher in the group of transluminal biopsies (17%). There is no major procedure-related complication in patients who underwent percutaneous biopsy. However, life-threatening bleeding after transluminal biopsies happened in two patients. **Conclusion:** Image-guided percutaneous biopsy is a safe and efficient alternative tool for the diagnosis of patients with GISTs.

Keywords: Safety; Efficacy; Image-guided percutaneous biopsy; Gastrointestinal stromal tumors

1. Introduction

Gastrointestinal stromal tumors (GISTs) are the most common subepithelial mesenchymal neoplasms in the gastrointestinal tract. They often arise from the stomach and proximal small intestine. However, they can occur in any portion of the alimentary tract, including the omentum, mesentery, and peritoneum in some rare cases [1]. Nowadays, the nonsurgical diagnosis of advanced unresectable tumors or recurrent tumors in GISTs has important prognostic and therapeutic implications because of the effective target therapy with oral tyrosine kinase inhibitors such as imatinib mesylate (Glivec; Novartis Pharma) and sunitinib (Sutent; Pfizer, Inc.). The specific diagnosis of GIST has to be based on immunocytochemistry study. Approximately 95% of GISTs are positive for CD-117 (C-kit), while 60% to 70% are positive for CD34 [2]. Endoscopy and endoscopic ultrasonography (EUS) are usually thought to be the best tools for the evaluation and nonsurgical biopsy of subepithelial tumors of the gastrointestinal tract [3]. Image-guided percutaneous biopsies carry the theoretical risk of rupture of the tumor capsule with peritoneal spread of disease [4]. However, percutaneous biopsy of a lesion suspicious for GIST may be indicated in a patient with a clearly unresectable disease. To our knowledge, a comparative study on the safety and efficacy of percutaneous biopsy in patients with GISTs is lacking. We hypothesized that image-guided percutaneous biopsies would be better than transluminal endoscopic biopsies for the diagnosis of GISTs. Therefore, the aim of this study was to compare retrospectively the safety and efficacy of image-guided percutaneous biopsies and transluminal endoscopic biopsies in our institution.

* Corresponding author. Department of Image Diagnosis and Intervention, Chang Gung Memorial Hospital at Linkou, and School of Medicine, Chang Gung University, No. 5, Fusing St., Gueishan Township, Taoyuan County 333, Taiwan (ROC). Tel.: +886 3 3281200x2585, +886 975 360167 (cell).

E-mail addresses: dr0389@yahoo.com.tw, ma0389@adm.cgmh.org.tw (J.-H. Tseng).

0899-7071/$ – see front matter © 2012 Published by Elsevier Inc.
doi:10.1016/j.clinimag.2011.04.002

2. Material and methods

2.1. Study population

From March 1999 to April 2010, a total of 58 procedures of transluminal endoscopic biopsies or image-guided percutaneous biopsies of subsequent pathologically confirmed GISTs were performed in 49 patients at our institution. One patient had both a transluminal biopsy for preoperative diagnosis and a percutaneous biopsy for diagnosis of recurrent tumors. One patient without surgical intervention had an endoscopic ultrasonography-guided biopsy after the failure of the initial conventional endoscopic biopsy. One patient had repeated CT-guided biopsies for diagnosis of pelvic recurrent tumors. Furthermore, three patients had multiple biopsies for diagnosis of primary tumors and metastases before subsequent surgical management. Within the total 58 procedures enrolled, 27 procedures (47%) were performed before subsequent surgical management. Seventeen biopsies (29%) were done for diagnosis of recurrent or metastatic tumors after surgical resection of primary tumors. Fourteen procedures (24%) were performed for diagnosis of unresectable disease, and these patients underwent target agent therapy. These patients were searched in the database of the GIST multidisciplinary meeting in our institution. All procedures were performed in accordance with the institutional review board guideline. Retrospective medical chart review and analysis were approved by our institutional review board.

2.2. Procedures

Percutaneous biopsies were performed with guidance of ultrasonography (n=20) or CT (n=15). CT scan of the abdomen and pelvis without and with intravenous injection of contrast medium enhancement was obtained in all these patients for planning of percutaneous biopsies. Conventional techniques of skin disinfection, draping, and local anesthesia were performed for preparation, and an 18-GA cutting biopsy needle with or without a 17-GA coaxial introducer was used. On the other hand, transluminal biopsies (n=23) were performed for tumors in stomach, small bowel, and rectum. Two patients with gastric GISTs had endoscopic ultrasonography-guided Tru-cut biopsy with a 19-GA needle. One patient with rectal GIST had cutting needle biopsy through rectal scope. Other transluminal biopsies were performed with conventional endoscopic biopsy forceps. The obtained tissue was reviewed by expert pathologists in our GIST multidisciplinary meeting.

2.3. Statistical analysis

The gender of the patients, location of primary tumor, and location of targeted tumor in these enrolled biopsies were collected and expressed as number and percentage. Age at initial diagnosis of the enrolled patients, length of follow-up, and size of the targeted tumor in biopsies were calculated and expressed as average and standard deviation. The size of the targeted tumors in different groups (US-guided biopsy, CT-guided biopsy, and transluminal biopsy) was compared by performing a one-way analysis of variance (ANOVA), and the significance levels were adjusted with the Scheffe's method. All statistical analyses were performed by using the SPSS statistical software (release 17.0.0; SPSS, Inc., Chicago, IL, USA). A P value of $<.05$ indicated a significant statistical difference.

3. Result

3.1. Patient population and tumor location

The demographic data and location of primary tumors of these patients are presented in Table 1. About half of these patients had primary tumors in the stomach (n=23). Fifteen patients had primary GISTs in their small bowel, and five patients had primary rectal GISTs. Furthermore, six patients had an initial presentation of multiple metastatic diseases without identifiable primary tumors. Two of them had percutaneous ultrasonography-guided biopsies of liver metastases, and another patient had CT-guided biopsy of liver metastasis. Ultrasonography-guided biopsies were also performed for peritoneal metastases in two patients. A CT-guided biopsy was done for diagnosis of multiple retroperitoneal metastases in one patient.

3.2. Comparison of percutaneous biopsy and transluminal biopsy

The anatomic location of targeted tumors in the 58 enrolled percutaneous or transluminal biopsies are summarized and analyzed in Table 2 as three different groups. Fourteen procedures (70%) of ultrasonography-guided percutaneous biopsy were performed for liver metastases,

Table 1
Patient demographics and diagnosis

Total patients	49
Sex (N=49)	
Male	32 (65%)
Female	17 (35%)
Age at diagnosis (year)	
Range	26–87
Mean	57.10
S.D.	13.32
Location of primary tumor (N=49)	
Stomach	23 (47%)
Small bowel	15 (31%)
Rectum	5 (10%)
Unknown	6 (12%)
Length of follow-up (years)	
Mean	5.34
S.D.	5.23