DIAGNOSTIC VALUE OF ENDOSCOPIC ULTRASONOGRAPHY FOR PREOPERATIVE LOCALIZATION OF PARATHYROID ADENOMAS

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INTRODUCTION

➢ Primary hyperparathyroidism (PHPT) is characterized by hypercalcemia and concomitant inappropriate secretion of parathyroid hormone (PTH) and is the most common cause of hypercalcemia in the outpatient setting . PHPT is caused by adenomas (80–85%), four-gland hyperplasia (10–15%), and rarely due to carcinoma (0.8–2%) .

➢ Conventional non-invasive imaging modalities are ultrasonography (US) and ^{99m}Technetium methoxyisobutylisonitrile (^{99m}Tc-MIBI) scintigraphy for enlarged parathyroid lesions. ^{99m}Technetium MIBI single-photon emission computed tomography (CT) and/or magnetic resonance imaging (MRI) can be used in cases of failure to detect small or ectopic tumors with those modalities.

➢ Endosonography (EUS) images lesions using a high frequency ultrasound probe, providing detailed visualization of the esophagus, stomach, and duodenum. Lesions in the mediastinum or near the esophagus can be detected with EUS, and a US-guided biopsy can be performed. A few small studies have evaluated the effectiveness of EUS for localizing parathyroid lesions before surgery.

➢ The purpose of the present study was to determine the diagnostic accuracy of EUS in terms of localizing parathyroid adenomas compared with those of US and ^{99m}Tc-MIBI scintigraphy findings. When compared to the previous reports in the literature, our study was conducted with the highest number of patients. Another outstanding and important feature of our study is inclusion of solely parathyroid adenomas.

METHODS

➢ Forty-seven patients with a PHPT diagnosis and who were recommended for surgery were enrolled in this study. An endoscopist who was blinded to the previous US and ^{99m}Tc-MIBI scintigraphy results performed the EUS in each patient.

RESULTS

➢ Thirty-nine female and eight male patients with PHPT were evaluated. The presence of adenoma was confirmed by subsequent postsurgical pathology results. One case was excluded because the histopathological evaluation was compatible with a lymph node, although the lesion was detected using three different imaging modalities preoperatively.

➢ Demographic data, distribution of adenomas according to location and the true positive rates of the imaging modalities are listed in Table 1.

➢ The locations of the parathyroid adenomas were correctly documented by US in 39 patients (84.7%) by ^{99m}Tc-MIBI scintigraphy in 35 (76.0%), and by EUS in 44 (95.6%) of 46 patients. EUS located all 31 adenomas detected previously with US and ^{99m}Tc-MIBI scintigraphy.

➢ EUS also successfully located three adenomas that could not be identified by US and ^{99m}Tc-MIBI scintigraphy.

➢ The positive predictive value and diagnostic accuracy of EUS, US, and ^{99m}Tc-MIBI were 97.7, 97.7, and 95.6%; 88.6, 97.5, and 86.9%; and 77.7, 97.2, 76.0%, respectively (Table 2).

➢ The location of the parathyroid adenoma was correctly documented by US in 39 (84.7%) Image of the parathyroid adenoma taken during EUS examination is shown in Figure 1.

CONCLUSION

➢ Preoperative localization of parathyroid pathology is important in appropriate cases of MIP. When the efficacy, comfort, cost, and low complication and morbidity rates of MIP are considered, EUS facilitated identification of lesions in patients in whom MIBI and US failed but did not need bilateral neck surgery and so were candidates for MIP. Therefore, EUS was a safe and effective imaging tool for parathyroid adenomas that could not be localized by US and parathyroid scintigraphy.

Table 1 Baseline demographical, clinical, and laboratory findings in patients with PHPT

	N=47
Age (year)	51.48 ± 14.49
Male / Female (%)	8/39 (17/83)
Serum calcium (8.6-10.2 mg/dL)	11.59 ± 1.30
Serum phosphorus (3.5- 4.5 mg/dL)	2.48 ± 0.54
Serum parathyroid hormone (11-67 pg/mL)	285.98 ± 127.96
25-OH vitamin D (20- 120 µg/L)	13.79 ± 8.50
Volume (cm^3)	2.05 ± 2.41*
True positive rates of imaging methods (%)	
Ultrasonography	39/46 (84.7)
^{99m}Tc-MIBI scintigraphy	35/46 (76.0)
Endoscopic Ultrasonography	44/46 (95.6)
Location of adenomas after operation	
Lower left (%)	22/45 (48.8)
Upper left (%)	3/45 (6.6)
Lower right (%)	17/45 (37.7)
Upper right (%)	3/45 (6.6)
Mediastinum	-
Histopathology	
Adenoma	45/47 (95.7)
*Only adenomas (N=45) Hyperplasia	1/47 (2.2)
Carcinoma	-

Table 2 Sensitivity, positive predictive value and diagnostic accuracy rates of the imaging methods

	US	^{99m}Tc-MIBI scintigraphy	EUS
Sensitivity (%)	88.6	77.7	97.7
Positive predictive value (%)	97.5	97.2	97.7
Diagnostic accuracy (%)	86.9	76.0	95.6

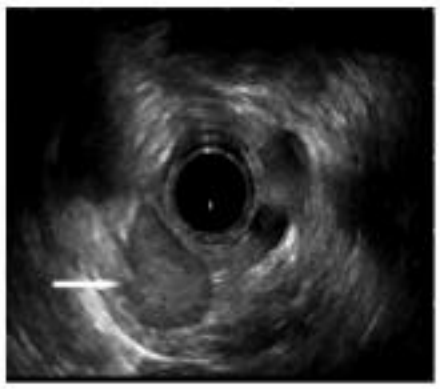

Fig 1 Endoscopic ultrasonography image of the parathyroid adenoma, showing a well-defined hypoechoic, solid lesion