

## ENDOSONOGRAPHIC DIAGNOSIS IN SUBMUCOSAL TUMOURS OF THE STOMACH

N. Joksimovic<sup>1</sup>, V. Serafimoski<sup>2</sup>

<sup>1</sup>*Gastroeneterohepathology Clinic, Medical Faculty, Ss. Cyril and Methodius  
University, Skopje, R. Macedonia*

<sup>2</sup>*Macedonian Academy of Sciences and Arts, Skopje, R. Macedonia*

**Abstract:** This study is a prospective clinical investigation that includes 158 patients (pts.), of whom 64 were diagnosed with gastric cancer by EUS in which operability was determinate, and 94 pts. with gastric submucosal tumours.

Endoscopy and pathohistological examination were used in the primary detection and diagnosis of the gastric cancer, and EUS was a supplementary method that revealed additional information about the extent of the neoplasms. According to the findings of the EUS, the patients were divided into 2 groups. The first group consisted of 94 pts (59.5%) with gastric submucosal lesions, and 64 pts (40.5%) with gastric cancer respectively.

The first group consisted of 94 pts. with submucosal tumours of the stomach. There were 71 pts with Leiomyoma, 11 pts with Leiomyosarcoma, 7 with an aberrant pancreas, 3 with submucosal cysts, one lipoma and one varix at fundus.

The second group consisted of 64 pts (40.5%) with gastric cancer. According to the EUS findings this group was divided into two subgroups: 45 operable patients and 19 inoperable patients with gastric cancer.

EUS proved a useful method for the diagnosis and follow-up of the patients with gastric cancer, as well as the staging of the tumour and follow-up during the post-operative period, and with submucosal tumours.

**Key words:** ultrasound, endosonography, submucosal tumour.

### *Introduction*

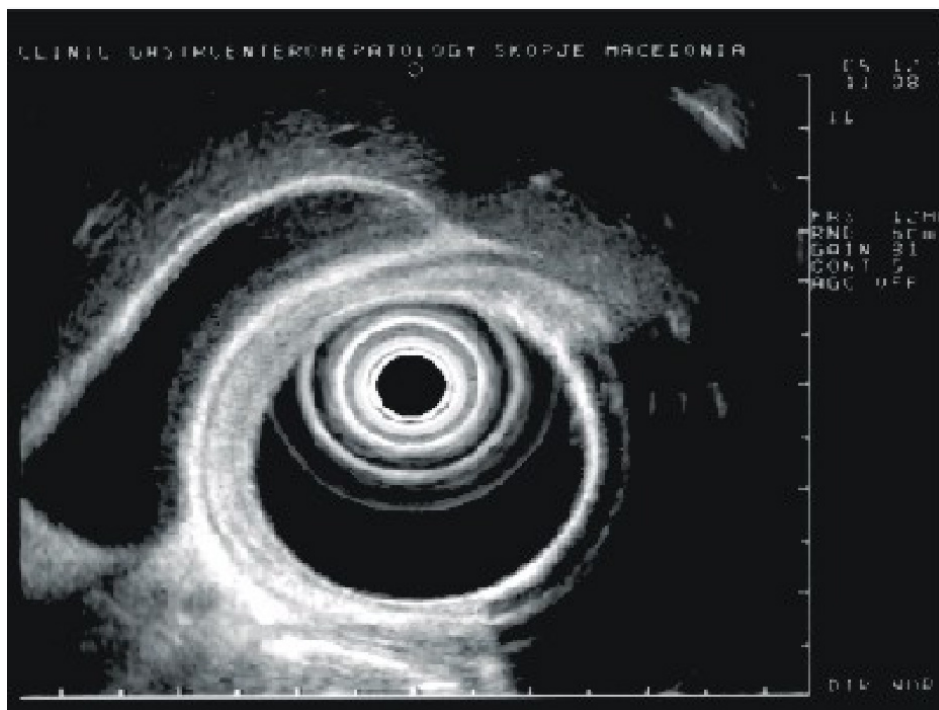
Endosonography is responsible for tremendous progress in the diagnosis and treatment of gastric mucosal diseases. However, it is still the case that only a limited evaluation of the nature of the abdominales of the wall of gastrointestinal organs is possible. Endoscopic ultrasonography (EUS) permits the visualization not only of the surface of the mucosa, but also of its whole thickness as well as of its five-layered structure. One of the main advantage of EUS is that not only can submucosal abnormalities be clearly imaged, but also any protrusion under the normal gastric mucosal lining of the stomach, whether intramural or extrinsic. EUS investigation in submucosal tumour of the stomach may be helpful in the following separate ways.

The diagnosis of a submucosal tumour (SMT) of the upper gastrointestinal tract by conventional endoscopy and radiologic modalities is not always definitive. These techniques may suggest the presence of an SMT, but do not clearly differentiate the nature of the lesion. Conventional endoscopic biopsy is frequently not diagnostic, as the biopsy forceps do not reach a tumour located deeper than the mucosal layer. EUS, having the ability to place a high-frequency transducer very close to the gastrointestinal wall, gives a detailed cross-sectional image of the gastrointestinal wall structure and adjacent organs or lymph nodes. It has been recently reported to be useful in the diagnosis of SMT.

### *Material and methods*

An endoscopic (gastroscopic), radiographic, computed tomography and endosonographic examination was made of 158 patients. (76 men and 82 women) aged on average 55.3 years, range 25–78, in order to prove the anamnestic consideration for gastric disease. Endosonography was not used for primary detection and diagnosis of gastric carcinomas but as a supplementary method which, apart from the basic data about the presence or absence of the tumour, gave additional data about the extent of neoplasm. However, endosonography as a usable supplementary method has to provide a sensitivity approximate to that of the method to which it is supplementary, in fact to be able to detect the lesion that was proved beyond doubt in this study. Ultrasonic examination was performed with an EU-M 20 "Olympus" endosonograph with a 12 MHz probe.

All patients were examined in the left lateral decubitus position and no patient preparation was required. The inserted portion of the transducer was always covered with a disposable balloon prior to gastric insertion. No portion of the gastric mucosa came into direct with the endorectal probe (Figure 1).



*Figure 1 – Endosonographic structure of gastric wall*

*Фигура 1 – Ендосонографски приказ на желудочен ѕид*

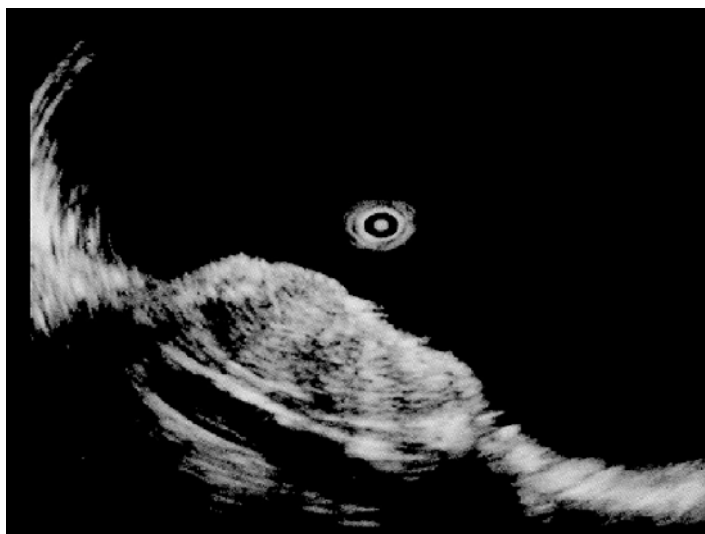
Water was then instilled through specially designed orifices in the transducer to permit proper acoustic interfacing between the transducer crystals and the gastric wall. Any residual air within the transducer-balloon interface was removed via the same portals prior to gastric insertion (Figure1). The only complications encountered were minimal bleeding in 7 patients. None required therapy. There were no perforations of the gaster.

### *Results*

According to the endosonographic results all of the patients, 158, (Figure 2) were divided into two groups: the first group consisted of 94 pts (59.5%) with gastric submucosal lesions, and the second group of 64 pts (40.5%) with gastric cancer respectively.

The patients from the first group, EUS classified with gastric submucosal tumours, consisted of 71 pts (45%) with Leiomyoma, 11 pts (7%) with Lei-

myosarcoma, 7 pts (4.5%) with aberrant pancreas, 3 (2%) with submucosal cysts, one (0.5%) lipoma and one (0.5%) varix at fundus.



*Figure 2 – Endosonographic findings of gastric submucosal tumour*  
*Фиџура 2 – Ендосоноџрафски љриказ на субмукозен љумор*

The second group consisted of 64 pts (32.5%) with gastric cancer. According to the EUS findings this group was divided into two subgroups: 45 operable patients and 19 inoperable patients with gastric cancer. (Tab. 1)

The endosonographic findings in the first sub-group that underwent surgery were correlated with the final intraoperative stage and pathohystology, and those in the second sub-group were compared with the operative finding during the palliation procedure and the final diagnosis of the additional investigation.

Table 1 – Табела 1

*Endosonographic classification of gastric cancer*  
*Ендосоноџрафска класификација на џелудочноџ карцином*

|         |         |         |       |
|---------|---------|---------|-------|
| St. 0   | Tis     | No      | Mo    |
| St. I   | T 1     | No      | Mo    |
| St. II  | T 2-3   | No      | Mo    |
| St. III | T 1-3   | N 1-2   | Mo    |
| St. IV  | секој T | секој N | M o-1 |

### *Discussion*

Preliminary results of endorectal ultrasound have suggested it is an accurate and relatively sensitive technique for the detection of gastric tumour mass, infiltration into the gastric wall and lymph node involvement (3, 10, 12). Our study at this time with a large series of patients has shown conclusively with surgical proof that cancer staging for gastric malignancy is more accurate by EUS ultrasound than by other imaging techniques presently in use.

Although histopathological investigations are indispensable to diagnose SMT precisely, careful observation of EUS findings such as the size of the tumour, the internal echopattern, the appearance of the tumour margin and the originating wall layer can help us predict the histopathological nature of SMT (4, 15). Well demarcated homogeneous hypoechoic tumours located within the fourth or second layers suggest leiomyoma or leiomyosarcoma. Unfortunately, exact differentiation between benign and malignant SMT by EUS is impossible. Nevertheless, there have been many efforts to differentiate between benign and malignant tumours by EUS. Generally, EUS features suggesting a benign tumour were known to be a smaller size, good demarcation and homogeneity, whereas those suggesting a malignant tumour were known to be a larger size, inhomogeneity and irregular margins, destruction of layers, and enlarged surrounding lymph nodes. In our study diagnostic accuracy of EUS in the differential diagnosis between benign and malignant tumours based on the above-mentioned criteria was 82.5%.

Other rare SMT include fibromas, inflammatory fibroid polyps, granulomas, carcinoid tumours, granular cell tumours, lymphomas, haematomas, neurogenic tumours and metastatic tumours. Because these lesions occur rarely it is not possible to describe their characteristic EUS features (6, 10). Most are usually located in the third sonographic layer.

However, because EUS cannot replace histology, EUS diagnosis concerning the histopathological natures of SMT is imprecise, but it is indubitable that EUS is superior to other conventional diagnostic modalities for the differential diagnosis of SMT, including endoscopy, barium study and CT scan.

A major limitation of the techniques, as in other imaging studies, is the inability to differentiate normal-sized normal lymph nodes from normal-sized tumour-infiltrated lymph nodes. Additionally, distinguishing tumour-enlarged nodes from enlarged nonmalignant lymph nodes is not possible. This deficiency is noted in both CT and ultrasound. The major differences in the ability to detect lymph node involvement by EUS, as opposed to CT, is that no strict criteria for ultrasound have been devised as they have for CT (1, 2, 9, 11). In general, computed tomography will only diagnose lymph nodes as abnormal if they are

greater than 1 cm in size. In our study, all lymph nodes were defined as abnormal if they were detected by endorectal ultrasound, regardless of size.

### Conclusion

Endoscopic ultrasound is a safe, simple, and relatively inexpensive procedure when compared with other techniques. It appears to be as good as or better than accepted imaging studies. As its use expands, it should have a great impact in determining appropriate therapy for patients with gastric cancer.

EUS is also a reliable and simple way of following up submucosal stomach tumours to decide upon their further clinical management.

Endosonography has an important role in the determination of the operability of gastric malignomas, following and predicting the degree of infiltration and determining the precise borders of the intramural infiltration, which is of great importance for postoperative prognosis.

### REFERENCES

1. Abe S., Yoshimura H., Nagaoka S., Monden N., Kinugasa S., Nagasue N., Nakamura T. (2003): Long term results of the operation for carcinoma of the stomach in T1/T2 stages; critical evaluation of the concept of early carcinoma of the stomach. *J Am. Coll Surg.*; 181: 389–96.
2. Ahlman H., Kolby L., Lundell L., Olbe L., Wangberg B., Granerus G., Grmelius L., Nilsson O. (1999): Clinical management of gastric carcinoid tumours. *Digestion*; suppl. 55: 77–85.
3. Caletti G., Odegaard S. S., Rosch T., Sivak M. V., Tio TL., Yasuda K. (2004): Endoscopic ultrasonography (EUS), a summary of the conclusions of the working party for the tenth world congress of gastroenterology Los Angeles, California. *Am. J. Gastroent.*; 89: 138–43.
4. Kajiyama T. (2002): The diagnosis of heterotopic submucosal gastric cysts by EUS. *Gastroenterol. Endosc.*; 31: 2078–83.
5. Kimmey M. B., Martin R. W. (1992): Fundamentals of endosonography. *Gastrointest Endosc. Clin N Am.*; 2: 557–73.
6. Kim J. H. (1991): Endoscopic ultrasonography EUS in the diagnosis of submucosal tumour of the upper digestive tract. *Korean J Intern Med.*; 41 (3): 313–23.
7. Lee A., Dixon M. F., Danon S. J., Kuipers E., Megraud F., Larsson H., Meligrad B. (1995): Local acid production and helicobacter pylori, a unifying hypothesis of gastroduodenal disease. *Eur. J. Gastroenterol. Hepatol.*; 7: 461–5.
8. Maruyama M. (1992): Early diagnosis of gastrointestinal cancer; double contrast gastrointestinal radiology. WB Saunders Co. Philadelphia, 496–532.

9. Murakami T. (1979): Early cancer of the stomach. *World J. Surg.*; 3: 685–92.
10. Nakamura T., Nakano G. E. (1985): Histopathological classification and malignant change in gastric polyps. *J. Clin. Pathol.*; 38: 754–64.
11. Palazzo L., Roseau G., Ruskone A. (1993): Endoscopic ultrasonography in the local staging of primary gastric lymphoma. *Endoscopy*; 25: 502–8.
12. Tio TL., Kallamans GE. (1994): Endoscopic ultrasonography of perigastric-intestinal lymph nodes. *Endoscopy*; 26: 776–9.
13. Tio TL. (1989): Preoperative TNM classification of gastric carcinoma by endosonography in comparison with the pathological TNM system: a prospective study of 72 cases. *Hepato-Gastroenterology*; 36: 51–6.
14. Tytgat G. N. J. (1992): Fockens P. Endoscopic ultrasonography. *Scand. J Gastroenterol.*; 27: 80–87.
15. Yasuda K. (1990): Diagnosis of submucosal lesion of the upper gastrointestinal tract by endoscopic ultrasonography, *Gastrointest Endosc.*; 36: 17–20.

### Резиме

## ЕНДОСОНОГРАФСКА ДИЈАГНОСТИКА НА ЖЕЛУДОЧНИТЕ СУБМУКОЗНИ ТУМОРИ

Н. Јоксимовиќ<sup>1</sup>, В. Серафимоски<sup>2</sup>

<sup>1</sup>Клиника за гастроентеро-хепатологија, Медицински факултет, Универзитет „Св. Кирил и Методиј“, Скопје, Р. Македонија

<sup>2</sup>Македонска академија на науките и уметностите, Скопје, Р. Македонија

Ова иследување претставува проспективна студија на 158 пациенти, од кои ендосонографски е најден карцином на желудник кај 64 пациенти, по што е определена негова операбилност, додека кај 94 пациенти е дијагностициран субмукозен желудочен тумор.

Во дијагностиката на карциномот на желудникот беше користена ендоскопија со патохистолошка дијагностика, додека ендосонографија беше користена како суплементарен метод за покажување на инфилтрационото распространување на малигномите на желудникот. Според ендосонографските наоди сите пациенти беа поделени во две групи. Првата група ја сочинуваа 94 пациенти (59,5%) со гастрични субмукозни тумори и втората група која ја сочинуваа 64 пациенти (40,5%) со желудочен карцином.

Во првата група на пациенти (94 со субмукозни желудочни тумори) кај 71 пац. беше дијагностициран Leiomyom, кај 11 Leiomyosarcom, аберантен панкреас кај 7 пациенти, субмукозни цисти кај 3 пациенти, кај еден пациент субмукозен липом и кај еден пациент варикозитети на фундусот на желудникот.

Втората група ја сочинуваа 64 пациенти (40,5%) со желудочен карцином. Според ендосонографските резултати оваа група беше поделена на две подгрупи, и тоа: ендосонографски операбилни пациенти 45 и ендосонографски неоперабилни желудочни карциноми 19 пациенти.

Ендосонографијата се потврди како корисен метод во дијагностиката и следењето на пациенти со желудочен карцином и субмукозните тумори, како во предоперативниот така и во постоперативниот период.

**Клучни зборови:** ултразвук, ендосонографија, субмукозни тумори.

**Corresponding Author:**

**N. Joksimovic**  
**Gastroenterohepatology Clinic,**  
**Medical Faculty,**  
**Ss. Cyril and Methodius University,**  
**Skopje, R. Macedonia**