

197 Endoanal Ultrasonography in Rectal Cancer.

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Author presents his own twenty years lasting experiences in using of Endoanal Ultrasonography (EUS). In accordance with more than 8 000 examinations he proves accuracy, easy using and inevitability of EUS in preoperative determination of the rectal carcinoma staging. The comparison of the rectal cancer (RC) invasivity determined by EUS in preoperative phase with the invasivity determined by histological examination from operative specimen in the set of 1005 patients, showed the consensus in 93 % and in the set of 576 patients after preoperative radiotherapy (RTX) in 88 %. He recorded correct invasivity of the recurrent RC by EUS at 88,2 % of the patients.

For T staging, EUS is the most accurate technique and although operator dependent. Although assesment of T stage is fairly accurate, the assesment of N stage is only moderately effective, whatever method is used. EUS is the most accurate for lymphatic spread near to the bowel wall, but is unable to assess more distant nodes.

Key words: *Endoanal ultrasonography, Rectal carcinoma*

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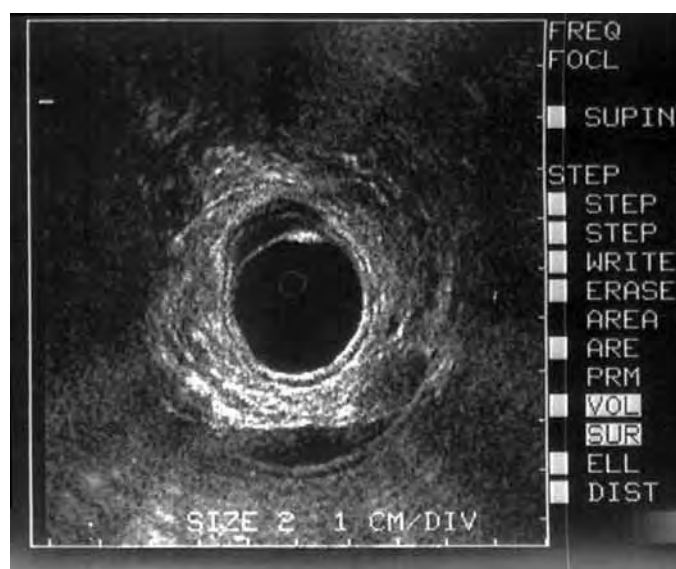
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Introduction

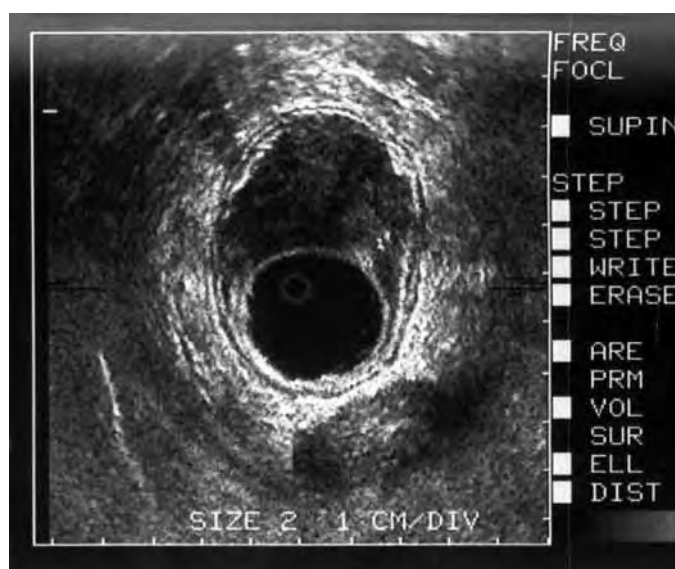
Digital examination of the rectum, endoscopic examination, determination of the CEA and Ca 19-9 levels, irrigoscopic examination, CT and MR have inevitable place in the diagnostics of the rectal carcinomas. Using of EUS in the clinical practise means a revolution in the early anatomic diagnostics of the rectal tumours (RT). EUS enables to diagnose also the RT in the size of less than 1 cm. It enables to determine the extent of the tumour infiltration in separate rectal stratum, in Lymph nodes in the mesorectum, in perirectal tissue and as well as possible infiltration of the organs close to the rectum. EUS enables clearly to determine „down staging“ of the RT after preoperative radiotherapy (RTX) and enables diagnostics of local recurrences of RT after the sphincter saving procedures and local recurrences after abdomino-perineal excision of the rectum by women.

Materials and methods

At our Surgical Department we work with the Brüel & Kjaer sonographic device, type 1846, with the endosonic probe of 7 MHz, type 1850. The probe is 24 cm long and its diameter is 19 mm. There is a taking off equipment on the probe's end and this rotates in the water environment. The head rotates 6 times in a second and USG signal is received in angle of 90 degrees measured from the axis and continuously the 360 degrees transversal sonographic cut of the rectum is created. Such cut enables to differentiate 5 basic stratum of the rectal wall: two hyper-echogenic zones – submucosa and serosa, and three hypo-echogenic zones – mucosa, muscularis mucosae and muscularis propria.



Picture 1: Rectal tumour in the stage uT₁



Picture 2: Rectal tumour in the stage uT₂

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Examinations	Number
Malignant and benign tumours of the rectum	1105
Post-operative transrectal examinations	4827
Post-operative transvaginal examinations	368
Judgement of the gynaecological tumours involvement in the pelvis	513
Periproctal abscesses and fistulas	584
Examination of the continent apparatus of the rectum	601
Polyposis familiaris	22
Colitis ulcerosa	39
Ulcus recti simplex	11

Sheet 1:

ET USG – set of 8 070 examinations –
January 1st, 1986 to December 31st, 2006

Type of examination	1 month after operation	Every 3 months after operation
Clinical examination	+	+
Endoanal transrectal USG	+	+
USG of the liver	+	+
CEA, Ca 19-9	+	+
Endoscopy	+	+
X-ray of the lungs	+	+
CT and/or MR	In the case of doubts about ET USG finding	

Sheet 2:

Observed parameters and frequency of the examinations
in post-operative period

EUS enables the pre-operative verification of four levels in tumour infiltration of the rectal wall, perirectal tissue and closed organs: uT₁ – tumour infiltrates the mucosa and submucosa (picture 1), uT₂ – tumour infiltrates the rectal wall's muscularis to serosa (picture 2), uT₃ – tumour penetrates through serosa to the perirectal tissue (picture 3) and uT₄ – tumour infiltrates the closed organs (picture 4).

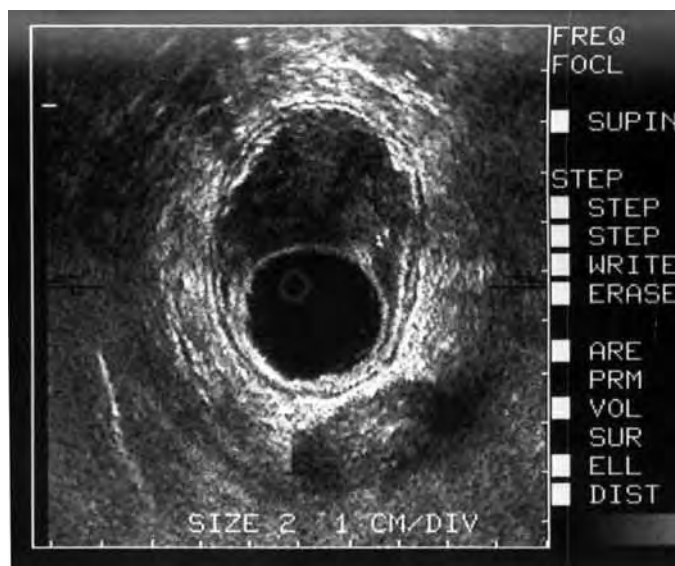
EUS enables the precise evaluation of the mesorectal Lymph nodes status and the precise determination of their size, location and number. (5,6,10) We need assesment of mesorectal Lymph nodes in preoperative time because metastatic involvement and the number of the mesorectal Lymph nodes involved is a major independent prognostic factor, regardless of the depth of tumour invasion.

Presence more than 3 involved mesorectal Lymph nodes is associated with a poor prognosis. Identification of a metastatic Lymph nodes in mesorectum is decisive factor for indication preoperative radiotherapy.

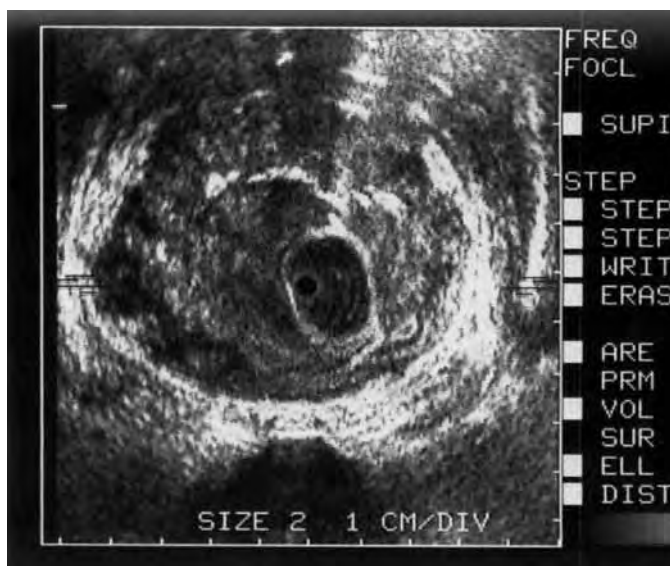
Early T₁ or T₂ lesions with mesorectal Lymph nodes involvement are not suitable for local excision. Lymph nodes involved in EUS picture are circular or slightly oval echo-poor lesions in the mesorectum, echogenicity similar to the tumour with border delineation, echo-poor rim, presence peripheral halo and hilar reflection and short axis diameter. (picture 5)

I made 8 070 EUS examinations from January 1st, 1986 to December 31st, 2006 and I examined 1105 patients with malignant and benign rectal tumours. In post-operative period, during the regular EUS controls of every 3 months, I made 4 827 examinations. I made trans-vaginal examination by 368 patients and 513 EUS controls by the verification of the gynaecological tumours possible invasivity. (Sheet 1).

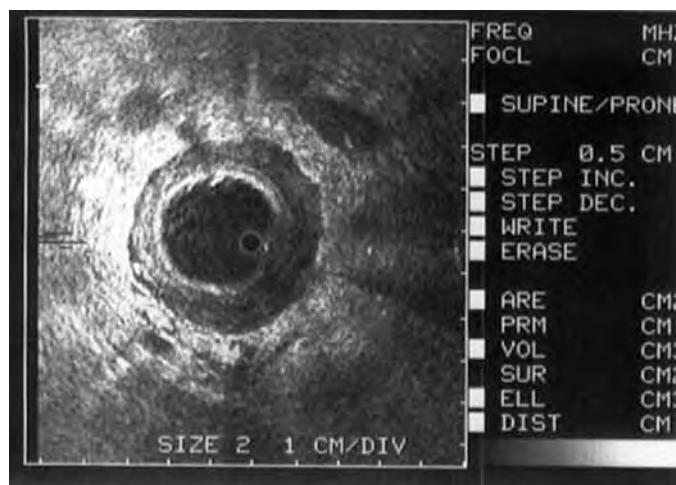
We have a computerised Dispensary of the malignant diseases of colon and rectum with the list of the patients after the sphincter saving operations for the low-sided rectal carcinomas in our department. Every three months are these patients examined with using of EUS and contemporaneously besides other parameters we observe also the dynamics of the changes in CEA and Ca 19-9 levels. (Sheet 2). The positive EUS finding in post-operative phase in the correlation with the change in CEA and Ca 19-9 levels are treated as an absolute indication for the „second-look“ operation. In the case of the unclear EUS finding we make a transperineal biopsy under the sonographic control with the following histological examination of the taken material. (Sheet 3).



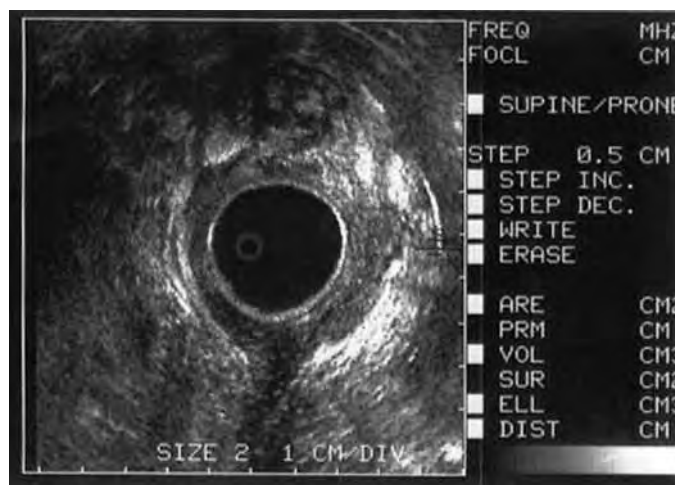
Picture 3: Rectal tumour in the stage uT₃



Picture 4: Rectal tumour in the stage uT₄

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Picture 5: Metastatic involved lymph nodes in mesorectum – lower third of the rectum



Picture 6: Local recurrence after sphincter saving procedure in the post-operative period in pre-clinical phase

Results and conclusions

The comparison of the RC invasivity determined by EUS in preoperative phase with the invasivity determined by histological examination from operative specimen in the set of 1005 patients, showed the consensus in 93 % and in the set of 576 patients after RTX in 88 %, and accuracy of EUS in predicting lymph nodes involvement showed consensus in 84% patients.

The recurrence of the malignant disease was found out by 40 patients from the set of 576 patients operated in the period of January 1st, 1997 to December 31st, 2006

(Picture 6). „Second look“ radical operations were made by 28 patients, e.g. 70 %. We made just palliative performances by 12 patients. By 28 radically operated patients we compare by EUS determined invasivity of the malignant process with the invasivity of the malignant process verified histo-pathologically

The correct invasivity of the recurrent malignant process was by EUS determined by 88,2 % of the patients.

Application of EUS in the clinical practise meant the important extension of the diagnostics modality as well as of the low-sided rectal carcinomas' surgical therapy – by the selection of the operative modality. (1,5,7,11). There have occurred possibilities for an early detection of the rectal carcinomas local recurrences after sphincter saving operational performances in the post-operative period. We are able to verify the carcinoma's recurrence in the pelvic floor or in perineum already in its pre-clinical phase by women after the abdominoperineal excision of the rectum (2,4,7,8). EUS has become a sovereign method of the examination by the determining of the rectal carcinomas staging. The EUS sensitivity by the pre-operative determining of the rectal carcinomas staging is proclaimed in the range of 90 up to 95 per cents. (1,10). Which are limitations and pitfalls of EUS by my retrospective clinicopathologic analysis of staging errors of RC according my twenty years experiences with EUS? Overstaging of tumour invasion depth is caused mostly by tumour invasion close to the deeper uninvolved layer. Inflammatory cell aggregation, desmoplastic change, and hypervascularity around the tumor mimicking tumour invasion.

Difficulties in endosonographic examination occur where the tumour is close the anal canal or the tumor is adjacent to one of the valves of Houston.

Polypoidal tumours and bulky tumours that do not lie within the focal length of the transducer can also lead to misinterpretation. Angulation of the probe to the tumor axis also can cause misinterpretation.

Radiotherapy can significantly hamper the assesment of wall invasion by the EUS. After irradiation the rectal wall is thickened, more hypoechoic and the different layers are less clearly visualized The EUS examination is not painful; manipulation with the sound is very easy. The interpretation of the obtained sonographic transversal cut of the rectum is obvious. In the case of any doubts mainly by the recurrences can the surgeon make his finding more objective by using the transperineal biopsy under the sonographic control. EUS have possibility to diagnose rectal tumours in size less than 1 cm and lymph node in size less than 0,5 cm.

The endosound has the equipment that enables to make a targeted punction and acquire the biopsy from the examined place. The fact, that endosonic probe is rigid lays stress upon the experiences by using of the sound higher than 10 cm from the anal margin. There is necessary to secure the rectal diameter of at least 2 cm by the examination that can be treated as an disadvantage.

For T staging, EUS is the most accurate technique and although operator dependent, is cheaper than CT or MR. If there is a possibility of tumour extension into adjacent organs or the pelvic side wall (imaged poorly by EUS). Some form of cross-sectional imaging is indicated and MR is the most accurate. Although assesment of T stage is fairly accurate, the assesment of N sta-

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ge is only moderately effective, whatever method is used. EUS is the most accurate for lymphatic spread near to the bowel wall, but is unable to assess more distant nodes. EUS, CT and MR are unable to detect micrometastases as lymph node size and characteristics are the diagnostic determinants of nodal involvement and these are not affected by micrometastases.

In spite of the endoprobe's high price is the examination economically advantageous because of minimal operational costs as well as physical wearing-out which can be proved by the fact that all examinations I had made with the same equipment from the beginning.

In the dynamic pursuing increased CEA or Ca 19-9

Positive finding of the recurrence by the ET USG

Positive finding by endoscopic examination in the correlation with the histologic examination of the taken biopsy

Positive finding of the recurrence by the CT or MR in the correlation with items 1 and 2

Sheet 3: Indications for "second look" operations**References**

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