ULTRASOUND STAGING OF THE RECTAL CARCINOMA

KORČEK J.
REGIONAL HOSPITAL, SURGICAL DEPARTMENT, SECTION OF THE COLON AND RECTAL SURGERY, NITRA, SLOVAKIA

Summary: Author presents his own thirteen years lasting experiences in using of Endoanal Transrectal Ultrasonography (ET USG). In accordance with more than 3300 examinations he proves accuracy, easy using and inevitability of ET USG in pre-operative determination of the rectal carcinoma staging. In post-operative observing author emphasises the meaning of ET USG for early determination of local recurrences of the rectal carcinomas, that enables to indicate "second look" operative performances as soon as possible.
Author points at the possible using of the ET USG by the evaluation of the continuity in the sphincter apparatus of the rectum as well as in diagnostics of the periproctal fistulas and abscesses.
Key words: endoanal transrectal ultrasonography, rectal carcinoma

Introduction

Digital examination of the rectum, endoscopic examination, determination of the C E A and Ca 19-9 levels, irrigoscopic examination, CT and MR have inevitable place in the diagnostics of the rectal carcinomas (sheet 1). Besides the CT and MR there is not possible to determine the staging of the rectal tumours one from the decisive factors of the operative modalities selection. CT and MR are able to diagnose just tumours in the size of more than 2 cm and besides both me-thods are quite costly. (5,9). Using of ET U S G in the clinical practice means a revolution in the early anatomic diagnostics of the rectal tumours. ET U S G enables to diagnose also the tumours in the size of less than 2 cm. (4,10,11). It enables to determine the extent of the tumour infiltration in separate re-ctal stratums, in lymph nodes in the meso-rectum, in perire-ctal tissue and as well as possible infiltration of the organs close to the rectum. (Sheet 2).

Material and methods

At our Surgical Department we work with the Briiel & Kjaer sonographic device, type 1846, with the endosonic probe of 7 M Hz, type 1850. The probe is 24 cm long and its diameter is 19 mm. There is a taking off equipment on the probeis end and this rotates in the water environment. The head rotates 6 times in a second and U S G signal is received in angle of 90 degrees measured from the axis and continuously the

Sheet 1: Diagnostics of the rectal tumours

1 Digital examination - criterions according to Mason
2 Endoscopic examination
3 Endoanal transrectal Ultrasonography
4 Determination of C E A and Ca 19-9 levels
5 Irrigoscopic examination
6 CT
7 M R

Sheet 2: Using of ET U S G in surgery

Pre-operative

1 Diagnostics of rectal tumours
2 Determination of rectal tumours staging
3 Determination of lymph nodes involvement in mesorectum
4 Determination of the infiltration extent in perirectal tissue and closed organs
5 Diagnostics of the periproctal abscesses and fistulas
6 Judgement of the continuity of puborectal sling and sphincter apparatus of the rectum

Post-operative

1 Diagnostics of local recurrences of rectal carcinomas after the sphincter saving operations
2 Diagnostics of local recurrences after the operations according to Miles by women

360 degrees' transversal sonographic cut of the rectum is created. Such cut enables to differentiate 5 basic stratums of the rectal wall: two hyper-echogenic zones - submucosa and serosa, and three hypo-echogenic zones - mucosa, muscularis mucosae and muscularis propria. (Picture 1).

ET U S G enables the pre-operative verification of four levels in tumour infiltration of the rectal wall, perirectal tissue and closed organs:

Sheet 3: ET USG - set of 3324 examinations (1.1.1986-31.12.1998)

Examinations	*Number*
Malignant and benign tumours of the rectum	512
Post-operative transrectal examinations	1642
Post-operative transvaginal examinations	146
Judgement of the gynaecological tumours involvement in the pelvis	324
Periproctal abscesses and fistulas	348
Examination of the continent apparatus of the rectum	352

Sheet 4: Observed parameters and frequention of the examinations in post-operative period

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 5: Indications for "second look" operations

1 In the dynamic pursuing increased CEA or Ca 19-9
2 Positive finding of the recurrence by the ET USG
3 Positive finding by endoscopic examination in the correlation with the histologic examination of the taken biopsy
4 Positive finding of the recurrence by the CT or MR in the correlation with items 1 and 2

Sheet 6: Strengths and disadvantages of ET USG in surgery

Strengths

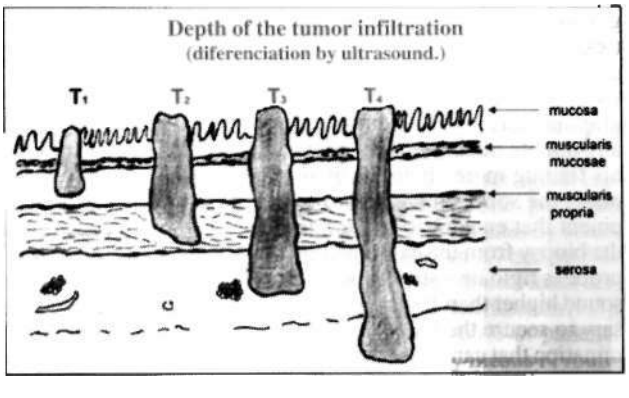
1 Examination makes any stress for patient
2 Simple manipulation with the endoprobe and equipment
3 Excellent precognitive ability of the device
4 Clear interpretation of taken sonographic cut of the rectum
5 Possibility to diagnose rectal tumours in size less than 2 cm
6 Economic advantage

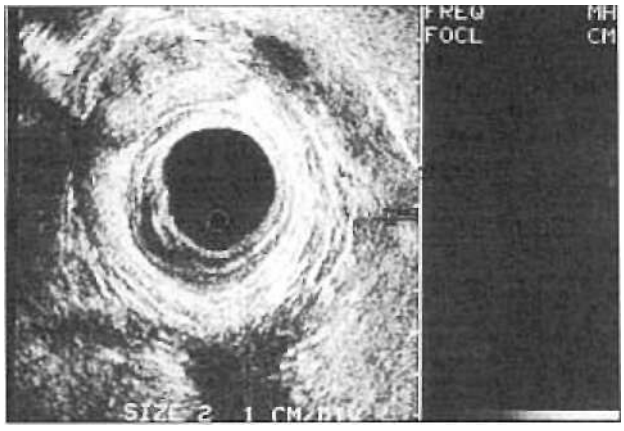
Disadvantage

1 Diameter of the rectum have to be more than 2 cm
2 Rigid handle of the endosonic probe

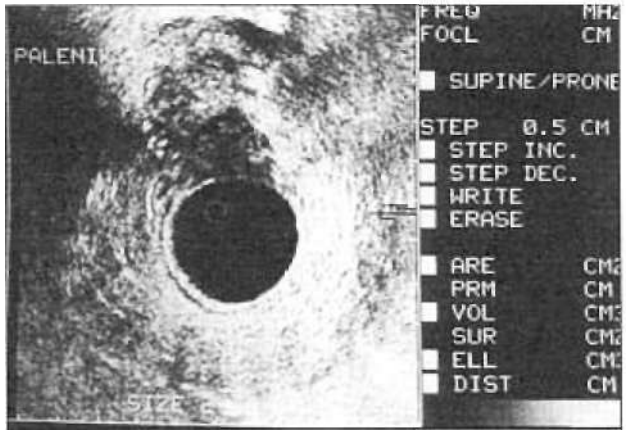
T1 - tumour infiltrates the mucosa and submucosa (picture 2)
T2 - tumour infiltrates the rectal wallis musculans to serosa (picture 3)
T3 - tumour penetrates through serosa to the perirectal tissue (picture 4)
T4 - tumour infiltrates the closed organs (picture 5)

Picture 1: Depth of the tumour infiltration



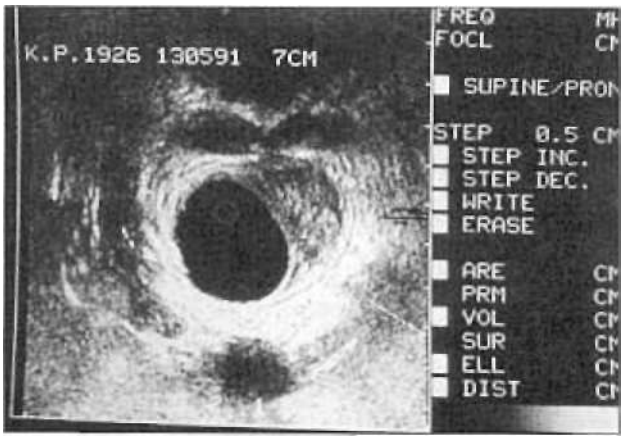


Picture 2: Rectal tumour in the stage uT_1

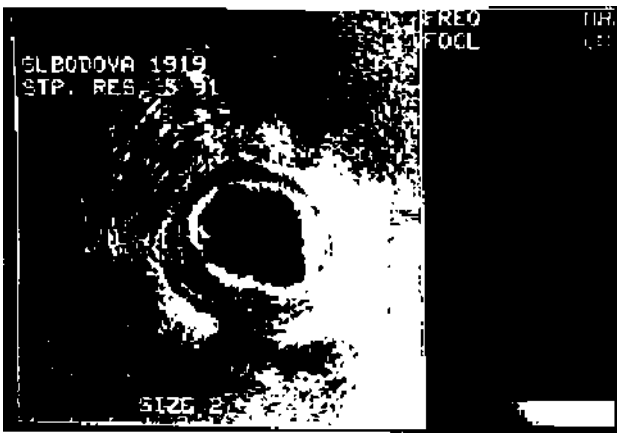


Picture 3: Rectal tumour in the stage uT_2

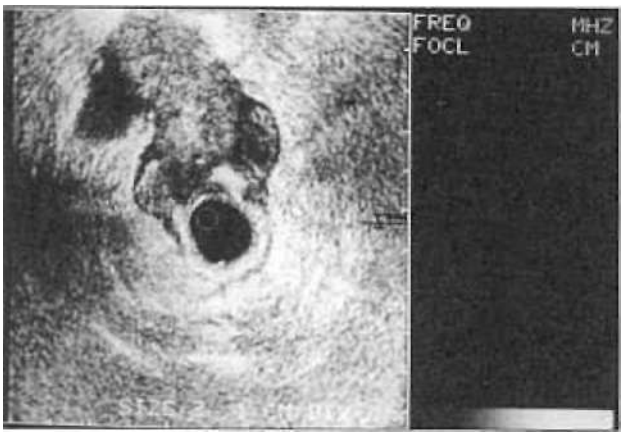
ET USG enables the precise evaluation of the mesorectal lymph nodes' status and the precise determination of their size, location and number. (5,6,10)
I made 3 324 ET USG examinations from January 1 st, 1986 to December 31 st, 1998 and I examined 512 patients with malignant and benign rectal tumours. In post-operative period, during the regular ET USG controls of every 3 months, I made 1642 examinations. I made trans-vaginal examination by 146 patients and 324 ET USG controls by the verification of the gynaecological tumours" possible invasivity. For the indication of the perirectal space inflammative affections I made 348 examinations. I judged the continent apparatus of the rectum and continuity of m. puborectalis by 342 patients. (Sheet 3).
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 ET USG and contemporaneously besides other parameters we observe also the dynamics of the changes in CEA and Ca 19-9 levels. (Sheet 4). The positive ET USG 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 ET USG finding we make a transperineal bio-psy under the sonographic control with the following histological examination of the taken material. (Sheet 5).
The comparison of the rectal carcinomas' invasivity determined by ET USG in pre-operative phase with the invasivity determined by histological examination from operative preparate showed the consensus in 91,6 per cents. The recurrence of the malignant disease was found out by 23 patients from the set of 212 patients operated in the period of January 1st, 1987 to December 31st, 1997. (Picture 6,7). "Second look"



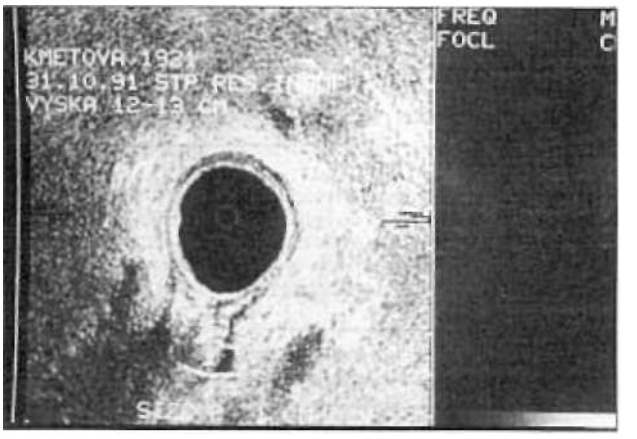
Picture 4: Rectal tumour in the stage uT.



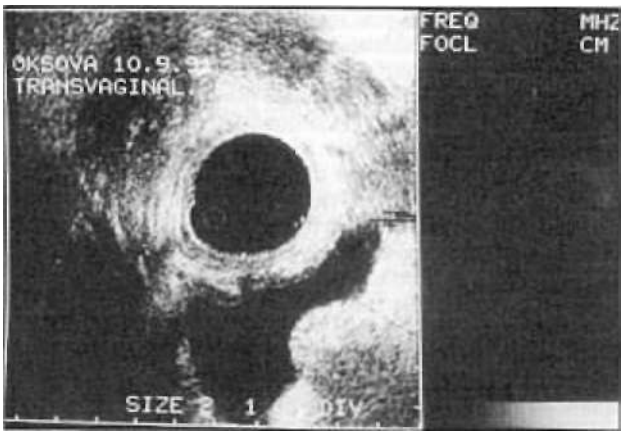
Picture 5: Rectal tumour in the stage uT



Picture 6: Recurrence of the rectal tumour



Picture 7: Recurrence of the rectal tumour



Picture 8: Transvaginal endosonography with endorectal sound probe - Recurrence of the Carcinoma canalis analis after the operation according to Miles

radical operations were made by 16 patients, e.g. 69,5 per cents. We made just palliative performances by 7 patients. By 16 radically operated patients we compare by ET U S G determined invasivity of the malignant process with the invasivity of the malignant process verified histo-pathologically. The correct invasivity of the malignant process was by ET U S G determined by 88,2 per cents of the patients.

Discussion

Application of ET U S G in the clinical practice 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). Former used clinical criterions by digital examination according to Mason seem to be in comparison with ET U S G very imprecise. Experienced surgeon approached only 40 per cents of the ET U S G staging determining by the Mason's judgement. (5). There have occurred new 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 amputation of the rectum. (Picture 8), (2,4,7,8). ET U S G has become a sovereign method of the examination by the determining of the rectal carcinomas' staging. The ET U S G sensitivity by the pre-operative determining of the rectal carcinomas" staging is proclaimed in the range of 90 up to 93 per cents. (1,10). The sensitivity in the post-operative period is up to 88 per cents. (1). ET U S G is irretrievable by the valuation of the relation, resp. distance from a tumour's low margin to a puborectal sling. There is possible to diagnostic also the primary rectal tumours or their recurrences (less than 2 cm) by ET U S G . CT or MR cannot do such diagnostics. The examination is not painful; manipulation with the probe 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. The endoprobe 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 10cm from the anal margin. There is necessary to secure the rectal diameter of at least 2cm by the examination that can be treated as an disadvantage. 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. (Sheet 6).

In accordance with the specialisation of our working place the importance of ET U S G by judging the integrity of the puborectal sling of the rectal sphincter apparatus has become higher in last time. I see the perspectives of the ET U S G also by the judgement of the periproctal inflammable affections and in the judgement of the gynaecological malignant diseases' invasivity.

Conclusion

In spite of the fact of no doubts about the ET U S G importance for pre-operative determining of the rectal carcinomas' staging and for the early diagnostics of their recurrences after the sphincter saving operations, there are only two devices in the whole Slovak Republic, these enables to make ET U S G with obtaining of transversal cut of the rectum in 360 degrees. The devices with the sector sound probe do not have the needed sensitivity of the examination, as well as there are many difficulties with the interpretation of the obtained sonographic picture. Herewith is necessary to realize that the surgeon and urologist can mutually use the device together with the endosonic probe. This fact has been already proved at our working place.

Literature:

1. Beynon, J., Mortensen, N.J.: Endoluminal ultrasound laboratoř and clinical experiment in Bristol Int J.Colorectal Dis. 1987, 1, p. 212-215
2. Beynon, J., Mortensen, N.J.: The detection and evaluation of locally recurrent rectal cancer with rectal endosonography Dis. Colon rectum 1989,32, p. 23-28
3. Glaser, F., Schlag, P., Herfarth, Ch.: Endorectal ultrasonography for assesment of invasion of rectal tumours and lymph node involvement Br. J. Surg. 1990,77, p. 883-887
4. Hildebrant, U., Klien, T., Feifel, G., Schwarz, H-P., Koch, B., Schmit, R M.: Endosonography of pararectal lymph nodes in vitro and in vivo evaluation Dis. Colon rectum 1990,33, p. 863-868
5. Holdsworth, P.J., Johnson, D.: Endoluminal ultrasound and CT in the staging of rectal cancer Br. J. Surg, 1988,75, p.1019-1022
6. Lindmark, G., Elvin, A., Pahlman, L., Glimelius, B.: The value of endosonography in pre-operative staging of rectal cancer Int. J. Colorectal Dis., 1992,7, p. 162-166
7. Lohnert, M., Dohrmann, P.: Value of endorectal sonography in the follow up of patients treated surgically of rectum carcinoma Zbl. Chir., 1991,116, p. 461-464
8. Morodomi, T., Isomoto, H., Shirouzu, K., Kakegawa, K., Irie, K., Marimatsu, M.: An index for estimating the probability of lymph node metastasis in rectal cancers Cancer, 1989, 63, p. 539-543
9. Rifkin, N.D., Wechster, R.J.: A comparison of CT and endoluminal sonography in staging of rectal cancer Int. J. Colorectal Dis., 1986,56, p. 219-223
10. Saitoh, N., Okuji, K., Sarashima, M, Araji, T., Nunomura, M.: Evaluation of echographic diagnosis of rectal cancer using intrarectal ultrasonic examination Dis. Colon rectum, 1986, 29, p. 234-242
11. Sumouchi, K., Sakaguchi, M., Higuchi, Y., Namiki, K„ Muto, T.: Small spot sign of rectal carcinoma by endorectal ultrasonography Dis. Colon rectum, 1998,41, p.649-653