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DETECTION AND STAGING OF PRIMARY RECTAL CANCER BY TRANSRECTAL SONOGRAPHY

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A b s t r a c t: This study is a prospective clinical investigation that includes 587 patients aged on average 55.3 years with symptoms such as perirectal pain, rectal bleeding, and change in bowel habit and tenesmus that had been investigated at the Clinic. Rectal cancer was diagnosed by endoscopy and pathohistologically confirmed in 377 cases.

Demonstration of tumor, extension into perirectal fat and lymph node involment were evaluated. Tumors were succesfully imaged by endorectal ultrasound.

According to the endosonographical results patients were divided into 3 groups: operable, consisting of 168 pts (29%), unoperable group of 205 pts. (35%) and control group with 214 pts (36%). However, transrectal sonography as a usable supplementary method has to provide approximate sensitivity as the method to which it is supplementary, in fact to be able to detect the lession that was proved beyond doubt in this study.

The results suggest that transrectal sonography has an importent role in the determination of the operability of rectal malignoma, following and predicting of the degree of infiltration and determining of the precise borders of the intramural infiltration.

Key words: Ultrasound, Endosonography, rectal cancer.

Introduction

The advent of newer surgical techniques has permitted the preservation of the anal sphincter in many patients with rectal cancer who previously requ-

ired abdomino-perineal resection. These and other approaches frequently utilize preoperative radiotherapy depending upon the stage of the cancer [4, 7, 9].

Computed tomography has until recently been the only accepted imaging modality for staging rectal cancer [1, 6]. Recently, reports have shown that endorectal ultrasound is a satisfactory alternative study that may complement computed tomography [8, 12].

We have extended our early clinical trials to evaluate a large-scale patient population to assess the accuracy of endorectal ultrasound and computed tomography in the staging of rectal malignancies.

Material and methods

An endoscopical (rectoscopical and colonoscopical) irrigographical computed tomography and endosonographical examination was made of 587 patients (264 men and 323 women) aged on average 55.3 years in order to prove the anamnestical consideration for rectal disease. Transrectal endosonography was not used for primary detection and diagnosis of rectal carcinoma but as a supplementary method which apart from the basic data about the presence or absence of the tumor gave additional data about the extent of neoplasma. However, endosonography as a usable supplementary method has to provide approximate sensitivity as the method to which it is supplementary, in fact to be able to detect the lession that was proved beyond doubt in this study.

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 condom prior to rectal insertion. No portion of the rectal mucosa came into direct with the endorectal probe (Figure 1).

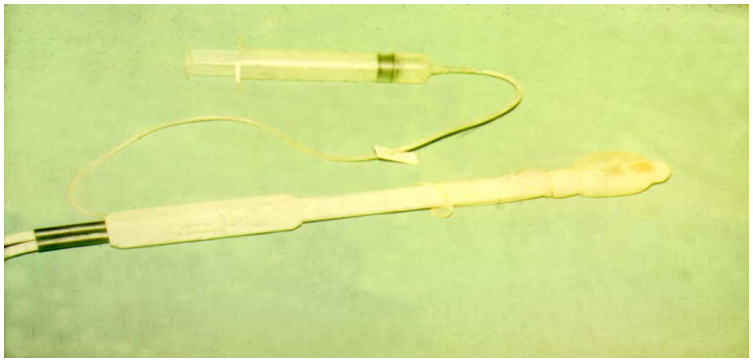

Figure 1 – *Endosonographic probe (7 MHz)*
Слика 1 – *Ендосоногӣрафска сонда (7 МХз)*

Water was then instilled through specially designed orifices in the transducer to permit proper acoustic interfacing between the transducer crystals and the rectal wall. Any residual air within the transducer-condom interface was removed via the same portals prior to rectal insertion (Figure1). Prior to endosonographic examination, a digital rectal study was performed to exclude the presence of stricture, fissure or obstructing mass.

The only complications encountered were minimal rectal bleeding in 57 patients. None required therapy. There were no perforations of the rectum.

Results

According to the endosonographical results (Figure2) patients were divided into three groups:

– Operable group consisting of 168 pts. (29%)

– Inoperable group consisting of 205 pts. (35%)

– Control group consisting of 214 pts. (36%)

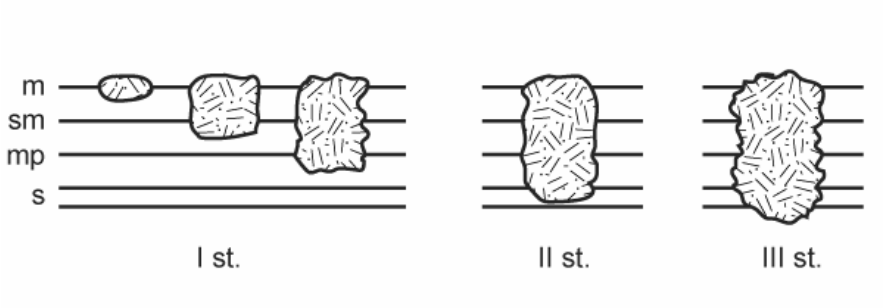

Figure 2 – *Endosonographic classification of rectal cancer. (CHIBA University)*

Слика 2 – *Ендосоногр̄афска класификација на рекш̄алниош̄ карцином (Чиба универзиш̄еш̄)*

Patients from the first group classified as operable rectal carcinoma (168) were compared with the definite surgical diagnosis, where using endosonographic classification 42 pts. (7,5%) had I-st degree, 126 pts. (35%) had II-nd degree, and there were no patients with III-rd degree malignity in this group (Figure 3).

All of the patients had radical surgery, where there were 5 in Duke's stage A, 44 in stage B, and 119 in stage C. It is obvious that endosonographic group one completely includes patients in Duke's stage A and B, while endosonographic group two includes patients in stage C according to Duke's classification.

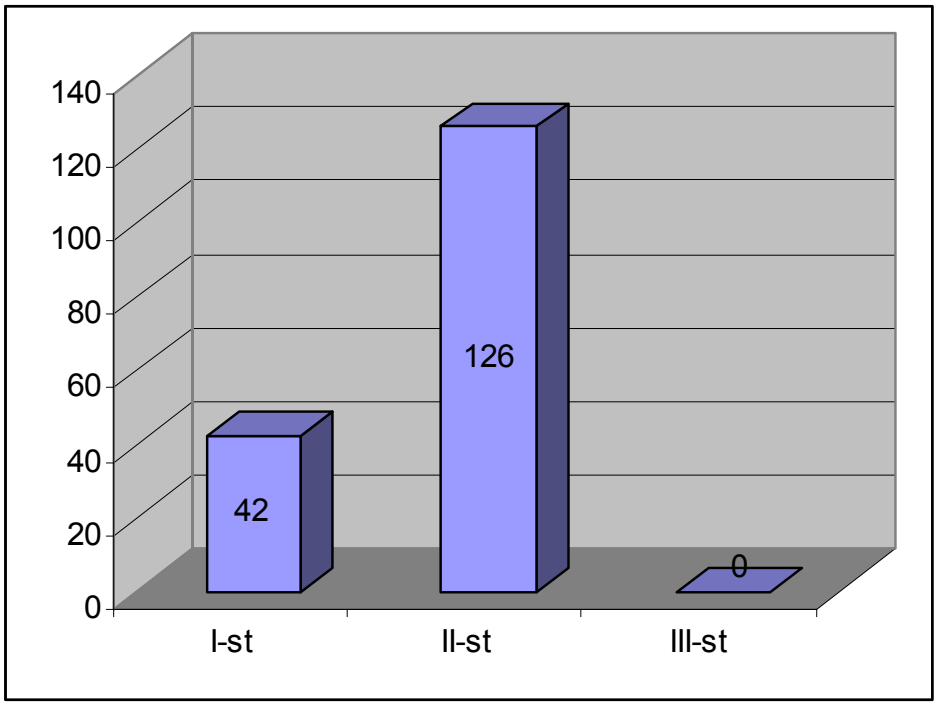

Figure 3 – *Endosonographic finding in operable group*
Слика 3 – *Ендосоногpафски наоди кај оūерабилнаūа гpуūа*

The group classified as inoperable tumors (205) was compared with operative findings of palliative operated patients and with the definite diagnosis for inoperability found by other methods. The first degree of malignant infiltration couldnot be found in this group. Only one patient was classified in group 2 while the rest of the patients were classified in the III-rd group. By reason of complications due to the primary process (ileuses) 55 pts. were operated on and the endosonographic diagnosis was confirmed by the operation findings.

The control group of patients (214) which was endosonographicaly classified to be without signs of primary neoplasmatical process in the rectal wall, and compared with the findings obtained by rectoscopy, colonoscopy and their combination. Ovarian tumors were found in 71 pts. (45 adenocarcinoma and 26 cysts), uterus tumors in 59 pts. (37 carcinoma and 22 myoma), prostate tumors in 58 pts. (41 carcinoma and 17 adenoma), IBD in 18 pts., perirectal abscesses in 5 pts., Hirschprung's disease in 2 pts., and torsion of the sigmoid colon in one patient (Table 1).

Table 1 – Табела 1

Endosonographic control group
Ендосоногрaфска контролна група

Diagnosis	No
Adenocarcinoma ovarii	45 (21.0%)
Ovarial cyst	26 (12.5%)
Myoma uteri	22 (10.0%)
Adenocarcinoma uteri	37 (17.0%)
Adenocarcinoma prostatae	41 (19.0%)
Adenoma prostatae	17 (8.0%)
IBD	18 (8.5%)
Perirectal abscesses	5 (2.5%)
M. Hirschprung	2 (1.0%)
Torsion of sigmoid	1 (0.5%)
sum	**214 (100%)**

Statistical analyses included sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV). These were defined and calculated as follows:

$$\text{Sensitivity} = \frac{TP}{TP+FN}$$

$$\text{Specificity} = \frac{TN}{TN + FP}$$

$$PPV = \frac{TP}{TP + FP}$$

$$NPV = \frac{TN}{TN + FN}$$

Nozologic and diagnostic values were computed separately for the operable and inoperable group, as well as a summary of the whole series of examined patients, where there was a great degree of sensitivity (95%) and specitivity (97%) of the endosonographic method, with low false positive results (0.02) and high predictive value of the positive finding (98%).

Discussion

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

A major limitation of the technique, as in other imaging studies, is the inability to differentiate normal-sized normal lymph nodes from normal-sized tumor-infiltrated lymph nodes. Additionally, distinguishing tumor-enlarged nodes from enlarged nonmalignant lymph nodes is not possible. This deficiency is noted on both CT and ultrasound. The major differences in the ability to detect lymph node involvement by endorectal ultrasound as opposed to CT is that no strict criteria for ultrasound have been devised as they have for CT [1, 2, 6]. In general, computed tomography will only diagnose lymph nodes as abnormal if they are greater that 1 cm in size. In our study, all lymph nodes were defined as abnormal if they were detected by endorectal ultrasound, regardless of size.

Another weakness of endorectal ultrasound is the inability to differentiate the more cephalad or caudal level I and III lymph nodes. The computed tomogram can detect enlarged (theoretically tumor-infiltrated, lymph nodes in these areas.

Endorectal ultrasound requires no patient preparation, requiring 5 to 10 min. to complete the study and is an adjunct to routine sigmoidoscopic examination. Equipment is relatively inexpensive, particularly compared to CT [6, 7]. Its advantage over magnetic resonance imaging cannot be ascertained at this time because of the limited experience with MRI. Perhaps as time progresses, MRI will be able to delineate those areas of abnormality that endorectal ultrasound cannot.

Conclusion

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

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

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Р е з и м е

ДЕТЕКЦИЈА И СТЕЈЏИНГ НА ПРИМАРНИОТ РЕКТАЛЕН КАРЦИНОМ СО ТРАНСРЕКТАЛНАТА СОНОГРАФИЈА

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Оваа студија претставува проспективна студија на 587 пациенти со просечна возраст од 55,3 години со симптоми како: болки во чмарот, крвавење од задното црево, стомачен дискомфор, нагони за дефекација. Ендоскопски и патохистолошки ректален карцином беше дијагностициран кај 377 пациенти.

Ендосонографски беше успешно анализирана големината на туморите, инфилтрацијата во околното мрсно ткиво и зафатеноста на лимфните јазли. Според ендосонографските резултати пациентите беа поделени во три групи: операбилни 168 пациенти (29%), неоперабилни 205 пациенти (35%) и контролна група на пациенти 214 (36%).

Трансректалната сонографија како суплементарен метод прикажа сензитивност како и методите на која им е суплементарна, односно дека е во состојба да ги детектира лезиите, што студијата недвосмислено го потврдува.

Резултатите сугерираат дека трансректалната сонографија има големо значење во одредувањето на операбилноста на ректалниот карцином, одредувајќи го степенот на инфилтрацијата и одредувајќи ги точните граници на истата.

Клучни зборови: ултразвук, ендосонографија, ректален карцином.