Visualisation of the rectum, rectoanal junction and adjacent structures is very demanding and challenging both with technical and medical side. Local staging of rectal and anal tumor and perianal neoplasm by conventional and single slice CT or by barium enema study is not so valuable. These methods can not visualise fistulous communication in inflammatory bowel diseases and have not any role in evaluation of fecal incontinence. During last decade, endoscopic ultrasound and magnetic resonance imaging have been recognised as methods of choice in establishing diagnosis of rectal, perirectal, anal and perianal diseases.

The aim of this article is to review the possibilities of endoanal ultrasound in evaluation of fecal incontinence.

Key words: endoanal ultrasound, fecal incontinence

INTRODUCTION

Endoanal ultrasound (EAUS) greatly influences clinical decisions in the diagnosis and treatment of many ano-rectal disease and disorders. It provides a means for accurate staging of anal and rectal cancers and dictates the need for or avoidance of surgical procedures. It plays also a major role in the evaluation of benign diseases such as various type of fistulas and submucosal masses.

Endoanal ultrasound has been available for more than two decades. During the past 10 years, its applications have become more established, mainly because of improvements in the technology of endoscopes and ultrasound transducers (10 MHz probes, rotating probes with 360 degree of scanning).

Endoanal ultrasonography (EAUS) is an accepted technique for local staging of both benign ano-rectal disease and disorders and malignant anal and perianal neoplasms.

The aim of this article is to review possibility of the EAUS in the evaluation both normal anal anatomy and ano-rectal disease and disorders (anal carcinoma, sphincter defects, anal fistulas, perianal abscesses and other pathological conditions).

Although fecal incontinence may be the result of several causes, anal sphincter injury is highly prevalent, as consequence of obstetrical trauma, ano-rectal surgery or accidental injury.

Childbirth is the most common cause of fecal incontinence and is due either directly to anal sphincter laceration or indirectly to damage to sphincter innervation. EAUS revealed that anal sphincter tears (especially external sphincter tears), sphincter laceration and sphincter division were far more common than was initially assumed. Many incontinent patients have intact sphincters and their symptoms are mainly due to idiopathic neuropathy or rarely due to sphincters fibrosis.

METHODS, TECHNIQUE AND RESULTS

MR imaging and EAUS and transvaginal ultrasound can accurately image the anal sphincter complex and surrounding perirectal tissues. Endorectal coil MR imaging is limited by patient discomfort, motion and claustrophobia and by expense and scanner available. In comparison, endoanal and transvaginal sonography are well tolerated, readily available, inexpensive and accurate in detecting anal sphincter disruption and involvement in patients with incontinence.

In many patients with incontinence the anal sphincter muscle have localized defects.

Any break in the continuity of hypoechoic ring of internal anal sphincter is abnormal and indicative of direct trauma (Fig.1). An interruption of the fibrillar echotexture of the external anal sphincter is abnormal (Fig.2). Discontinuity of the sphincter at EAUS indicates a tear. Scarring is characterized by loss of the normal texture that usually has low reflectiveness. The sphincter muscles may also...
show local thickening or thinning. Generalized external sphincter atrophy is difficult to appreciate because of the vague contours of the muscle ring.

Some authors found that perineal body measurement improved evaluation of anterior anal sphincter defects in females. They conclude that incontinent women with obstetric trauma to the anal sphincter have perineal body thickness of 10 mm or less. We classified EAUS status of internal anal sphincter as normal or ruptured and external anal sphincter as normal, partial ruptured or total rupture. EAUS is accurate for diagnosis of sphincter disruption and approaches 95%. The accuracy of EAUS has been validated both histologically and intraoperatively. EAUS is more accurate than electromyography but not to manometry. EAUS proved superior to endovaginal MR imaging in diagnosing defects of external anal sphincter but EAUS and endovaginal MR imaging were equivalent in diagnosing defects of internal anal sphincter. Some authors reported that endoanal MR imaging was better than EAUS in the detection and characterization of anal sphincter defects. Stoker et al. suggest that dynamic MRI may be a valuable alternative as the pelvic floor muscles are visualized and both EAUS and endoanal MR imaging can be used for detection of anal sphincter defects. But one must have in mind that EAUS examination is well tolerated, easily available and a cheap examination compared to endovaginal or endoanal MR imaging. Three dimensional EAUS has been described and increase our understanding of anal sphincter dysfunction.

**FISTULAS**

Major causes are obstetric or surgical trauma, inflammation (Crohn’s disease, postoperative infection) and radiotherapy. With standard EAUS technique complete region of the anovaginal and rectovaginal septum has to be imaged to locate the fistula. EAUS sign of fistula is continuous hypoechoic linear structure with possible hyperechoic reflections (air) between anal canal or rectum and vagina. Graded compression and decompression can be performed when necessary to differentiate between a vessel and a track. Presence of the fistula is joined with the defect of internal and external sphincter. Some stated that non-contrast EAUS was not useful in imaging rectovaginal fistulas and cannot recommended as a diagnostic or screening tool for the identification of a rectovaginal fistula.

Perianal fistulas (Fig.3) are classified according to their primary path of extension relative to the external anal sphincter and to the puborectalis muscle (superficial, intersphincteric, transphincteric, suprasphincteric or extraspincteric). Use of peroxide-enhanced anal endosonography allows visualization of entire course of the echogenic fistula, including its relation to the internal and external sphincters and the levator ani muscle. This depiction of fistulas permits accurate classification, which facilitates surgical planning. After gentle injection of peroxide through the cannulated external openings of the fistula standard EAUS is performed. Attention should be focused on integrity of the internal and external anal sphincters, since tears or defects may arise from or be associated with focal infections, previous injury or surgery. Fistulas usually appear as hypoechoic bands or focal soft tissue abnormalities in any location within anal wall. Abscesses (Fig.4) seldom contain air, and fistulas are usually narrow and have an irregular path, so fluid or even air within the track is unlikely to be easily recognized. It is therefore difficult to distinguish between abscesses and scarring or to confirm the path or patency of a track without the use of a contrast enhancing agent. Some authors found that EAUS with high frequency transducer was superior to digital examination for preoperative classification of fistula in ano. While MR imaging remains superior in all aspects, EAUS is valuable alternative for identification of internal opening. In their study EAUS was used correctly classify 81% of all primary tracks and confidence intervals for EAUS and MR imaging overlapped.

The value of imaging fistula preoperatively is to detect tracks and internal openings that might otherwise be missed during surgical exploration. This is more likely when the fistula is complex, and a road map of the fistula is helpful to not only plan surgery but also ensure that no
track is missed so as to minimize recurrence\textsuperscript{17}. In recurrent or complex fistula in ano three dimensional (3D) EAUS proved more accurate for detecting primary tracks and internal openings than for detecting extensions. Hydrogen peroxide improved conspicuity of some tracks and internal openings and so may be helpful in difficult cases, although no overall diagnostic benefit was demonstrated\textsuperscript{17}. LIMITATIONS Initially, the use of EAUS in the anal canal was complicated by insufficient acoustic coupling which was solved by development of a sonolucent plastic cone. EAUS may be poorly tolerated in patients with fecal incontinence caused by anorectal fistulas. In that circumstances transvaginal ultrasound of the anorectum is well tolerated and can accurately detect abnormalities of the anal sphincter and surrounding structures\textsuperscript{3,4}. Limitations of EAUS include strictures and acute painful conditions. These cave-ats are largely caused by size of regular rectal probes with an average diameter of 17 to 20 mm. Previously, painful condition often require general or spinal anesthesia to facilitate the examination. The introduction of EAUS probes with diameter below 1 cm (7 mm) represent major improvement particulary for imaging all layers off the anal canal even under acute pain\textsuperscript{18}. The second pitfall of EAUS, also caused by size of the probes, are changes in the anatomy of the anal canal resulting from stretching of the anal canal and compression of mucosal tissues. Thus, the EAUS picture of the anal canal does not reflect the anatomic situation, which makes it difficult to judge the status of the anoderm and to locate the haemorrhoidal tissue. These artefacts are also likely to cause problems identifying internal openings of fistulas or locating small fistula tracts entirely\textsuperscript{18}. The use of a small endoanal probe of only 7 mm in diameter enabled us overcome these limitation. The limitation of EAUS versus endoanal MR imaging, however, should be the poor inherent contrast on images, which makes characterisation of the external anal sphincter difficult but it could be overcome with higher frequency transducer (10 MHz)\textsuperscript{19}. CONCLUSION Findings on endoanal ultrasound greatly influence clinical decisions in the treatment of many anorectal diseases and disorders. Its allows accurate staging od anorectal cancer and helps in determine the need for surgical procedure. It also plays a major role in evaluation benign diseases and submucosal masses. The process of learning techniques of endoanal and endorectal ultrasonography is lenghty and this fact has restricted its use to large tertiary referral centers. SUMMARY Vizualizacija rektuma, rektoanalnog spoja i okolnog tkiva je zahtevna kako sa tehničke tako i sa stručne strane. Klasični barijumski pregled i konvencionalni ili single slice spiralni CT pružaju malo informacija u lokalnom starijanju rektalnih i analnih tumora, perirektalnih neoplažnje, Nepouzdanost ovih metoda se ogleđa i u teškom prikazivanju fistuloznih komunikacija u bolesnika sa zapaljenskim bolestima creva i u evaluaciji bolesnika sa fekalnom inkontinencijom. U toku poslednje decenije, ultrazvuk i MR su značajno unapredili dijagnostiku rekalnih, perirekalnih, analnih i perianalnih bolesti. Cilj ovog rada je da da prikaz mogućnosti endoanalnog ultrazvuka u proceni fekalne inkontinencije. Ključne reči: endoanalni ultrazvuk, fekalna inkontinencija BIBLIOGRAPHY 1. Maier AG, Kreuzer AH, Herbst F et al. Transrectal Sonography od anal sphincter infiltration in lower rectal carcinoma. AJR 2000; 175:735-739 2. Law PJ, Kamm MA, Bartram CI. Anal endosonography in the investigation of fecal incontinence. Br J Surg 1991; 78: 312-314