is still not widely available on most of standard ultrasound equipment in the Western world. Furthermore, the 21% alteration in surgical management in his cohort of 24 colorectal cancer patients is noticeably much lower compared with the 29.8% change in the surgical management in our study [the statement of 22.8% in his letter is inaccurate].[1,2] In addition, there was a 35.1% change in the combined IOUS/CT/MRI staging following CE-IOUS in our study. The higher impact of CE-IOUS in our study may be accounted for by the superiority of the dedicated higher frequency probe and software that we used.

While these results are interesting and should encourage others to reproduce, we do need to be cautious as the current technology is still evolving and only long-term outcome studies will determine its true value in clinical practice.

Edward Leen, MD, FRCR
Pierre Carlo Ceccotti, MD
Department of Radiology
Royal Infirmary
Glasgow, U.K.
e.leen@northglasgow.scot.nhs.uk

Susan Moug, MRSC
Paul Horgan, PhD
Department of Surgery
Royal Infirmary
Glasgow, U.K.
e.leen@northglasgow.scot.nhs.uk

REFERENCES

1. Leen E, Ceccotti P, Moug SJ, et al. Potential value of contrast-enhanced intraoperative ultrasonography during partial hepatectomy for metastases: an essential investigation before resection? *Ann Surg*. 2006;243:236–240.
2. Torzilli G, Del Fabbro D, Palmisano A, et al. Contrast-enhanced intraoperative ultrasonography during hepatectomies for colorectal cancer liver metastases. *J Gastrointest Surg*. 2005;9:1148–1153.

Is There an Increased Risk of the Vas Deferens Occlusion After Mesh Inguinal Hernioplasty and What Can We Do About It?

To the Editor:

Shin et al, in a recent multicenter study, highlighted the risk of the inguinal vas deferens injury after tension-free hernioplasty.[1] They observed obstructive azoospermia in 14 patients which led to infertility due to simultaneous, but different pathology of the reproductive organs of the contralateral side. The authors attribute the result to a robust fibroblastic process around the mesh, injuring and occluding the vas deferens.[1] In the same issue of *Annals of Surgery*, Fitzgibbons, in an editorial, made many pertinent comments with which we mostly agree.[2] He argues that there may not be a causal relationship between fibrosis around the mesh and vas obstruction since no such correlation was ever proven directly. It is true that obstructive vas deferens azoospermia can be also caused by intraoperative damage of the vas during dissection, suturing, or use of electrocoagulation.[2] As he fairly stated, there is also no doubt that the implantation of mesh in hernia repair surgery is a tremendous breakthrough, significantly reducing the recurrence rate and therefore decreasing the risk of spermatic cord injury during reoperation for recurrences.

However, both articles noted that the problem is the difficulty in clearly defining the extent of unilateral vas deferens occlusion. In most cases, such injury does not give any clinical symptoms and does not compromise fertility due to normal function of the contralateral testis or simply, in many patients, the fertility state is never evaluated after the operation. Patients presented in the multicenter study are those in which fertility was compromised due to bilateral reproductive system pathology, at least on one side due to vas deferens occlusion after hernioplasty. Therefore, it is also possible that these patients with clinical symptoms could be the tip of the iceberg of the patients with asymptomatic unilateral vas injury, which was never diagnosed.

It is very well established that the fibroblastic process around the polypropylene mesh is essential for posterior wall reinforcement but can also be harmful to organs in direct contact with the mesh, especially under pressure. Such fibrosis around the mesh can trap and damage inguinal nerves, intestine, urinary bladder, and can even occlude the urethra after polypropylene tape suspension in treatment of stress urinary incontinence.[3–6] Therefore, there is a very strong rationale that such processes can also involve the inguinal vasa when it is exposed to the mesh after dissection of the spermatic cord, and we should not ignore this situation. However, the reality remains that we do not know the actual complication rate due to rare clinical presentation.

Because of the above rationale and until the true complication rate is assessed, why not offer the option of an operation that limits the potential risk of vas deferens occlusion? This option might be extremely attractive to those with unilateral hernias and impairment of the contralateral testis or even to those patients who do not wish to risk compromise of their reproductive health.

One easy solution could be separation of the spermatic cord from the mesh. In the sutureless tension-free Trabucco technique, preshaped polypropylene mesh is placed on the posterior wall of the inguinal canal and the oblique aponeurosis is reapproximated **below** the spermatic cord, in contrast to other tension-free techniques. In this way, polypropylene mesh is placed flat between 2 fascial layers, the transversalis fascia and the oblique aponeurosis, which limits fibrotic tissue ingrowth into intrafascial space, leading to uniform, solid scar formation and preventing recurrence.[7,8] Oblique passage of the spermatic cord through the inguinal canal is not essential after this reinforcement of the abdominal wall.

With this technique, the spermatic cord is placed in the subcutaneous tissue, free from direct contact with the mesh and avoiding chronic inflammatory tissue. Long-term results of this technique are as superb as other tension-free repairs and are well described.[7–13] For those who prefer the Lichteinstein hernioplasty, reapproximation of the oblique aponeurosis below the spermatic cord, instead of over it, could also solve the problem of the potential vas injury complication. A randomized study could be performed to assess the effectiveness of such modification of the Lichteinstein technique, but in our opinion there is sufficient indirect evidence to support our thesis.

A hole for the spermatic cord in preshaped mesh instead of the shutter-valve effect of mesh tails sutured to-

gether could also decrease the contact of the mesh and the cord without compromising the effectiveness of the technique. The efficacy of this approach was clearly proven in the Trabucco technique and other repairs with utilization of the preshaped onlay mesh with a hole for the spermatic cord. The proposed surgical techniques comply with principles of the tension-free operation and can be easily implemented.

In summary, although the actual inguinal vas occlusion rate due to fibroblastic inflammation around mesh is not known now, there is a strong suggestion that such a process can take place and there is need to evaluate it. Therefore, in the meantime, all those patients with any compromise to their reproductive health or who are concerned about their fertility could be offered a surgical technique that minimizes the potential risk without compromising all the advantages of the tension-free hernia repair.

Piotr Witkowski, MD, PhD
Department of Surgery
Columbia University
New York, NY
Department of Surgery
Medical University of Gdansk
Poland

Ermanno E. Trabucco, MD
Trabucco Hernia Institute
New York, NY

REFERENCES

1. Shin D, Lipshultz LI, Goldstein M, et al. Herniorrhaphy with polypropylene mesh causing inguinal vasal obstruction: a preventable cause of obstructive azoospermia. *Ann Surg*. 2005;241:553–559.
2. Fitzgibbons RJ Jr. Can we be sure polypropylene mesh causes infertility? *Ann Surg*. 2005;241:559–561.
3. Amid PK. Radiologic images of meshoma: a new phenomenon causing chronic pain after prosthetic repair of abdominal wall hernias. *Arch Surg*. 2004;139:1297–1298.
4. Dunn JS Jr, Bent AE, Ellerkman RM, et al. Voiding dysfunction after surgery for stress incontinence: literature review and survey results. *Int Urogynecol J Pelvic Floor Dysfunction*. 2004;15:25–31.
5. Sweat SD, Itano NB, Clemens JQ, et al. Polypropylene mesh tape for stress urinary incontinence: complications of urethral erosion and outlet obstruction. *J Urol*. 2002;168:144–146.
6. Chuback JA, Singh RS, Sills C, et al. Small bowel obstruction resulting from mesh plug migration after open inguinal hernia repair. *Surgery*. 2000;127:475–476.
7. Trabucco EE, Trabucco AF. Tension-free, sutureless, preshaped mesh hernioplasty. In: Nyhus, Condon, eds, *Hernia*, 5th ed. Philadelphia: Lippincott Williams & Wilkins, 2002:159–164.
8. Trabucco EE, Trabucco AF. Flat plug and mesh hernioplasty in the 'inguinal box': description of the surgical technique *Hernia*. 1998;2:133–138.
9. Trabucco EE. Sutureless mesh inguinal hernioplasty. In: Bendavid R, ed. *Prostheses and Abdominal Wall Hernias*. Landes, Austin, 1994, 380–382.
10. Cucci M, De Carlo A, Di Luzio P, et al. The Trabucco technique in the treatment of inguinal hernias: a six-year experience. *Minerva Chir*. 2002;57:457–459.
11. Testini M, Miniello S, Piccinni G, et al. Trabucco versus Rutkow versus Lichtenstein techniques in the treatment of groin hernia: a controlled randomized clinical trial. *Minerva Chir*. 2002;57:371–376.
12. Adamonis W, Witkowski P, Smietanski M, et al. Is there a need for a mesh plug in inguinal hernia repair? Randomized, prospective study of the use of Herta 1 mesh compared to PerFix Plug. *Hernia*. 2006;10:223–228.
13. Taruffi F, Bernini M, Pantalone D, et al. Tension-free hernioplasty with prosthesis: comparison of 2 techniques. *Chir Ital*. 2002;54:819–827.

Ductoscopic Biopsy of Papillary Tumors in Women With Nipple Discharge

To the Editor:

We read with great interest the article by Moncrief et al reporting a comparative study on the management of women with nipple discharge with or without ductoscopy-guided excision.[1] Ductoscopy improved the localization of intraductal lesions and the proportion of women with intraductal neoplasia was greater in the group undergoing ductoscopy-guided excisions (88% vs. 81%). Visualization of a luminal lesion correlated significantly with proliferative disease, but reliable distinction between benign and malignant lesions was not possible based on the endoscopic appearance. Of the 49 papillomatous lesions visualized, 36 (73%) were indeed papilloma, 5 (10%) were cancer, 3 were atypical hyperplasia (6%), and 3 were hyperplasia of usual type. Although cytology results were not reported, it is well known from other studies that the specificity of ductoscopic cytology is limited.[2] The authors conclude that new methods such as optical spectroscopy will be required to improve the in situ diagnosis of intraductal lesions.

A method for intraductal tissue sampling would significantly improve the diagnostic potential of ductoscopy and could help to define the appropriate surgical procedure in patients with ductal lesions. However, it has been difficult to establish ductoscopic biopsy techniques, mainly because of the small dimensions of ductoscopes (diameter <1 mm).

We have developed a simple ductoscopic biopsy technique that allows precise tissue sampling from intraductal breast lesions under visual control.[3] The biopsy device consists of a special biopsy needle with an outer diameter of 0.9 mm and a rigid gradient index ductoscope with a diameter of 0.7 mm. The needle has a lateral oval opening located 3 mm from the distal tip. The surface of the opening is designed as a blade to cut off tissue samples from lesions that protrude into the lumen. Usually, the tip of the ductoscope is ending at the tip of the cannula, thus sealing the biopsy chamber. When a neoplastic lesion is found, the ductoscope is withdrawn 4 mm to open the biopsy chamber. Under visual control, the lesion can now be maneuvered into the lumen of the biopsy needle. Then vacuum is applied while the instrument is withdrawn from the duct. Multiple tissue samples can be obtained, and substantial parts of smaller lesions may be removed by repeated biopsies. The size of the biopsy samples is approximately 1 mm and the diagnostic quality is generally good.

With the biopsy device, ductoscopy was performed in 30 patients who presented with pathologic nipple discharge. The examinations were carried out preoperatively using topical anesthesia with an anesthetic cream. The study was approved by the institutional review board and informed consent was obtained from all patients. Papillary tumors or obstructing lesions were identified in 21 patients (70%). The biopsy procedure was technically successful in all cases. On average, 3 tissue specimens (range, 1–5) were sampled from any suspicious lesion. Biopsy specimens in diagnostic quality were obtained in all but 1 patient. Histopathology revealed papilloma in 17 patients (80%), ductal carcinoma in situ in 2 patients (10%), and invasive ductal carcinoma in 1 patient. Histopathologic analysis of the resection specimen confirmed the diagnosis made by ductoscopic biopsy in all cases. The rate of 14% cancerous lesions diagnosed by ductoscopic biopsy in patients with nipple discharge compares favorably to the data of Moncrief et al[1] and others.[4]