

LAPAROSCOPIC TREATMENT OF INCISIONAL HERNIA

J. Himpens*, G. Leman*, T. Sonnevile*, G.B. Cadière**

Bruxelles - BELGIQUE

The optimal treatment of incisional hernia remains controversial. Whereas most authors agree that mesh is needed for hernias over 4 cm in diameter [10], the recurrence rate, the incidence of complications and especially the pain [23] experienced by the patient are factors that give the procedure a poor reputation. The laparoscopic approach has the advantage of reducing pain in a significant number of operations [28]. Incisional hernia is now commonly treated by laparoscopy. Reports are found as early as 1994 [22]. The advent of new bowel-friendly prosthetic materials has greatly increased the popularity of the technique [26]. The present study was undertaken in an effort to analyze the technique and the short-term results of laparoscopic incisional hernia repair.

MOTS CLÉS : Laparoscopy, Incisional hernia, Mesh repair, Composite mesh.

□ MATERIALS AND METHOD

Between August 1st 1999 and May 1st 2001, all patients presenting with incisional hernia with a diameter equal or larger than 4 cm were treated laparoscopically. They were all operated on with the intention to fix the hernia with mesh.

Fifty-four patients were treated. Fourteen patients were male, forty were female. Ages ranged from 24 to 79 years (median 52 years). The hernia defect averaged some 15 cm [4, 28].

SURGICAL TECHNIQUE

The laparoscopy tower was positioned to the right of the patient. The surgical team was placed to the left. The patient was placed supine, the arms abducted. General anesthesia and endotracheal intubation were used.

Pneumoperitoneum was initiated by the Veress technique, usually in the left upper quadrant.

One 10 mm and two 5 mm trocars were inserted in the left flank. A 30 degree optical system was placed in the 10 mm trocar.

The adhesions between bowel and abdominal wall were severed by sharp dissection, usually using the "harmonic scalpel" (Ultracision^①). The hernia sac was left in place but great care was used to reduce all its contents.

After completion of this thorough adhesiolysis, the size of the hernia was very accurately measured. A bi-faced

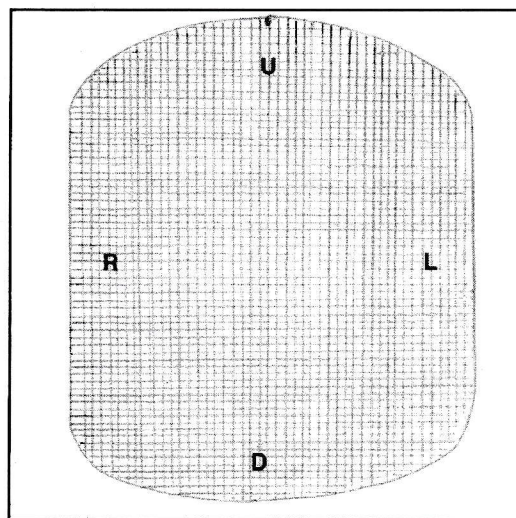


Fig. N° 1 *The mesh has been shaped to its appropriate size and shape. Markings are put on both sides of the mesh*

prosthesis (Composix^②) was cut at an appropriate size (at least 5 cm overlap with the defect). This mesh has 2 faces: one is a polypropylene knit and the other is expanded PTFE.

① Ethicon Endo-surgery

② Bard

③ Cook

A number of marks (up, down, right, left) were then placed on the PTFE side so as to help its orientation within the abdomen (Fig. N° 1). The mesh was rolled tight like a cigarette and placed in a strong sterile bag (Lapsac[®]), held by a curved Kocher clamp.

The bottom of the bag had been cut out allowing later easy passage of the mesh. A 2 cm incision was made through the skin at the apex of the hernia. The incision was carried down until the peritoneum was opened. The bag was placed in this opening and the mesh advanced intraperitoneally.

After the introduction the bag was removed and the skin was closed tightly so that the CO₂ leak was stopped. The mesh was unfolded and oriented in a correct position, as could be seen by the marks on the PTFE.

A thread of Ethibond[®] mounted on a straight needle was then placed through the skin some 5 cm proximal to the defect on the midline. The needle was picked up intraperitoneally by a needle holder, driven through the

mesh on the proximal midline mark and then pushed outside through the skin (Fig. N° 2). The thread was snapped by a mosquito clamp and left loose. This manoeuvre was repeated at the distal end (Fig. N° 2b). The two threads were then pulled taut which raised the mesh against the anterior abdominal wall. Two additional stitches were then inserted in the same fashion 5 cm lateral to the defect at the level of the equator.

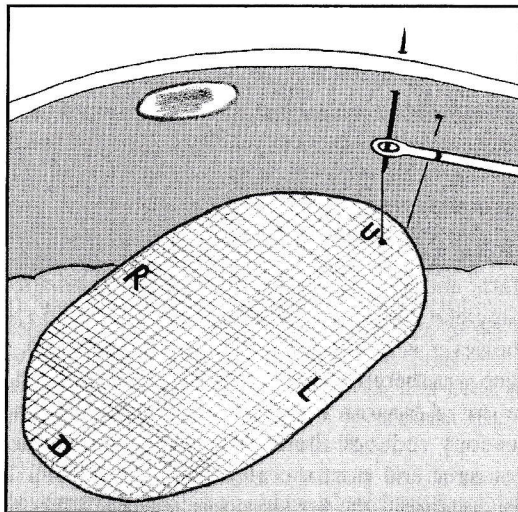


Fig. N° 2 Stay sutures are placed percutaneous through the mesh first cranially then distally

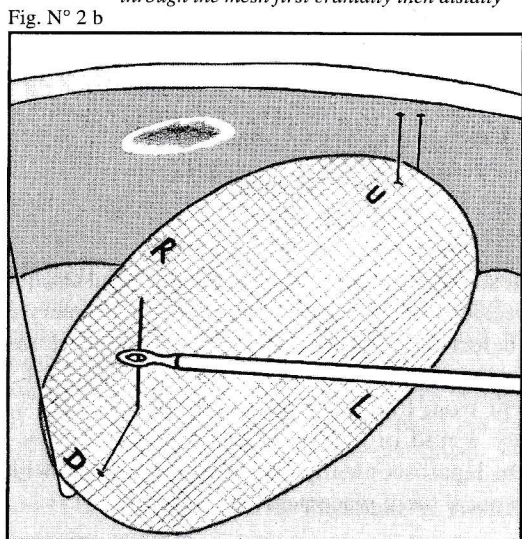


Fig. N° 2 b

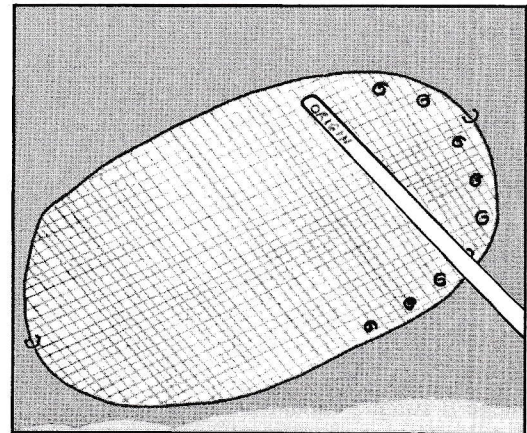


Fig. N° 3 The mesh is lifted by pulling on the stay sutures. The mesh is now fixed on the abdominal wall by the double crown technique

The mesh was then tacked at its periphery by a tacking device (Protack[®]) (Fig. N° 3). A second row of tacks were subsequently placed in a smaller circle just outside the defect (doughnut fixation).

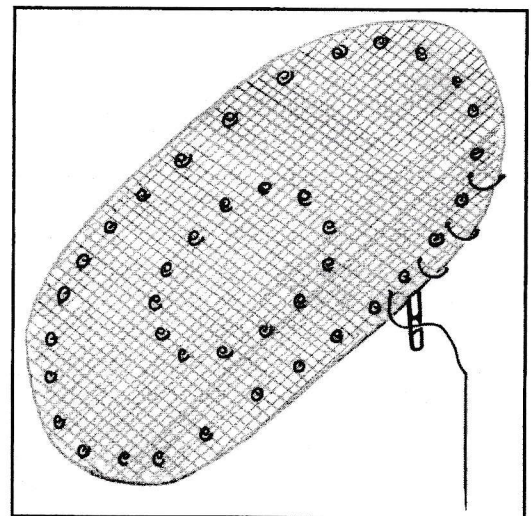


Fig. N° 4 Sutures are now placed percutaneous through the mesh. They are picked via the same stab wound by an endoclose device

^④ Ethicon

^⑤ Tyco Healthcare

^③ Cook

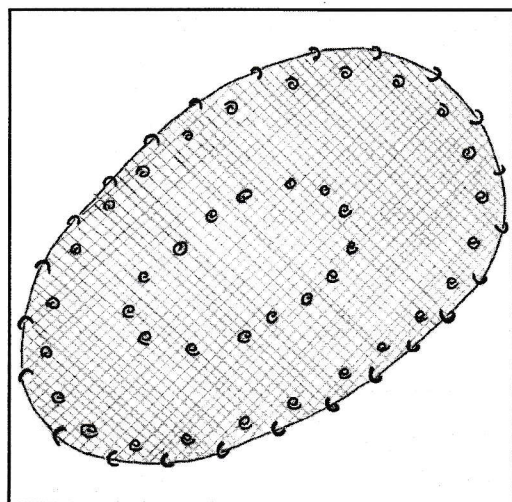


Fig. N° 5 Final aspect: the mesh was securely fixed by both tacks and sutures

The percutaneous stitches were removed. Small incisions were then made in the skin at the level of the periphery of the mesh, about 2 cm apart.

Prolene 0 stitches mounted on a straight needle were passed through the incisions, driven through the periphery of the mesh and picked up by an Endoclose® device (Fig. N° 4) introduced through the same skin incisions but oriented some 1 cm lateral to the mesh. Hence the mesh was completely fixed by two rows of tacks and a circle of prolene stitches at its periphery (Fig. N° 5).

RESULTS

There were no conversions.

Peroperative complications occurred in three patients: during adhesiolysis the bowel wall was lacerated, which was treated by laparoscopic suturing, and the hernia was treated by laparoscopic raphy with non degradable sutures.

Immediate postoperative complications included 5 seromas (9%) and 1 sepsis at postoperative day four, treated by exploratory laparotomy, suture of a small bowel perforation, removal of the mesh and suture closure of the defect.

Hence, 50 patients out of the 54 patients ended up with mesh. All patients were seen by the first author during the month of August, 2001.

Follow-up ranged from 3 to 24 months (median 11 months). Three patients could not be traced. There were no postoperative deaths. One patient in the mesh group had a recurrence after 11 months. Three of the four patients (75%) in whom mesh placement had to be abandoned had a recurrence after an average of 6 months [2, 10]. The total amount of recurrences is thus 4 (7.4%). If we consider the no-shows as recurrences, the total number would be 7 (13%).

DISCUSSION

Incisional hernia is a frequently occurring condition. Between 2 [16] and 5% [9] of all laparotomies are followed by an incisional hernia. Causing factors are operative technique [8], deficiency in healing factors [ref], diabetes and obesity [12, 25]. In this latter group of patients the incidence of postoperative incisional herniation may well be as high as 35% [5].

There is a consensus that incisional hernia needs treatment [13]. Repair can be primary or by mesh. Mesh placement dramatically reduces the number of recurrences [6]. Even smaller defects probably demand mesh insertion [1, 14, 23] but there is no consensus on the matter. We therefore only selected patients with a hernia diameter of 4 cm or larger. Mesh can be placed preperitoneally or intraperitoneally.

- *Preperitoneal placement* is safe but requires an extensive dissection of the already weakened abdominal wall. Intraperitoneal adhesiolysis may or may not be associated. Postoperative recurrence rate is low, but complications are frequent [16, 29].

- *Intraperitoneal placement* reduces abdominal wall trauma but must always be associated with extensive intraperitoneal adhesiolysis [17]. Intraperitoneal mesh has a grim track record [4] but recently there have been reports on good results with this strategy [27].

The more recent, *bi-faced mesh material* like the one we used is probably better suited for this approach. PTFE is bowel friendly [3 19] but induces poor ingrowth of fibroblasts and connective tissue [7]. Its combination with polypropylene knit however allows good ingrowth [26]. The mesh however is bulky and difficult to introduce. A special technique was therefore developed for laparoscopy [11].

The use of laparoscopy for this indication makes sense. Laparoscopy reduces the abdominal wall trauma hence reduces pain and postoperative disability [24]. In this specific condition, the laparoscopic approach has become the technique of choice in many centers [15].

A critical step in the procedure is *fixation of the mesh*. It appears that staple or even tacker fixation alone is not sufficient [17]. We therefore chose the additional suture fixation. The percutaneous fixation with a straight needle and an Endoclose® is elegant and quick and avoids intraperitoneal suturing which is demanding [21]. Moreover it allows for full wall fixation which is the technique of choice [18].

We experienced a 5% incidence of peroperative complications. *Bowel perforation* is a dreadful complication and precludes the placement of mesh [15]. Primary closure of the defect under traction however was characterized by a very high recurrence rate in our series, which is not different from the experience of others [3, 10]. A better strategy would probably have been to treat the bowel problem laparoscopically and then to proceed with open preperitoneal mesh placement [2].

We had one case of postoperative *bowel fistula* which was treated by laparotomy, small bowel resection and removal of the mesh. Delayed bowel perforation is a serious complication and was extensively documented in the literature [20]. It can be avoided by the meticulous choice of atraumatic graspers, by the avoidance of electrical dissection of adhesions and by compulsive inspection of the bowel at the end of the procedure. In our case it is likely the electrical current was responsible for the delayed bowel damage. Fever and abdominal pain were the symptoms that prompted reexploration, despite a noteworthy negative Ultrasound and CT scan. At laparotomy, a perforation sealed off by the mesh was found.

Our follow-up is too short to allow significant conclusions. In hernia series a follow-up time of 5 years or even longer are encouraged [19].

We therefore conclude that our series shows that laparoscopic incisional hernia treatment with mesh is a safe and sound procedure. In case of mishaps like bowel

damage it is probably indicated to convert to open extraperitoneal mesh placement after "closed abdomen" laparoscopic treatment of the bowel problem. In the postoperative period delayed bowel perforation must be kept in mind when the patient complains of abdominal pain and despite negative imaging.

- ① AZ St Blasius,
Kroonveldlaan 50
9200 Dendermonde - Belgium
- ② CHU Saint-Pierre
322 rue Haute
1000 Brussels - Belgium

SUMMARY

Background: The optimal treatment of incisional hernia is still controversial. This study examines the feasibility, safety and short-term results of video-assisted endoscopic incisional hernia treatment with mesh.

Methods: Between August 1, 1999 and May 1, 2001 the authors used the laparoscopic approach for the treatment of incisional hernias over 4 cm in diameter. Fifty-four patients were treated (14 males, 40 females). Ages ranged from 24 to 79 years (median 52). Median follow-up time was 11 months (3-24).

Results: Operating time ranged from 60 to 280 minutes (median 100). Peroperative estimated blood loss was less than 50 cc. Median hospital stay was 3 days (1-28). Peroperative complications included bowel perforation in 3 patients, treated by laparoscopic bowel suture and primary raphy of the hernia without mesh. Postoperative complications were: 5 seromas (10%), 1 sepsis on postoperative day 4, treated by laparotomy, small bowel resection, mesh removal and raphy of the hernia without mesh. Of the 50 patients in whom mesh had been placed, one developed a recurrence (2%). Of the 4 patients who did not receive mesh, 3 (75%) developed a recurrence after an average of 6 months (2-10). If we analyze the recurrence rate on an intention to treat basis the result is 7.4%

Conclusion: The laparoscopic treatment of incisional hernia is safe and reliable. The complication rate is low. The recurrence rate is low provided mesh could be placed successfully. Longer follow-up times are mandatory.

RÉSUMÉ

Le meilleur traitement des hernies incisionnelles est encore controversée. Ce travail étudie la faisabilité la fiabilité et les résultats à court terme du traitement endoscopique vidéo-assisté, par prothèse, des hernies incisionnelles.

Méthode: D'août 1999 à mai 2001 les auteurs ont utilisé la voie laparoscopique pour le traitement des hernies incisionnelles d'un diamètre supérieur à 4 cm. Cinquante-quatre patients ont été traités (14 hommes et 40 femmes). L'âge moyen était de 52 ans (24-79). Le suivi moyen a été de 11 mois (3-24).

Résultats: Le temps opératoire moyen a été de 100 minutes (60-280). Les pertes sanguines peropératoires n'ont pas excédé 50 cc. Le séjour hospitalier moyen a été de 3 jours (1-28). Les complications peropératoires ont consisté en une perforation intestinale chez 3 patients, traitée par suture intestinale sous laparoscopie et raphie de la hernie sans pose de prothèse. Les complications postopératoires ont été 5 séromes (10%), 1 sepsis au 4^{ème} jour postopératoire traité par laparotomie avec résection d'intestin grêle, enlèvement de la prothèse et raphie de la hernie sans prothèse. Sur les 50 patients chez lesquels une prothèse avait été mise en place, un seul a présenté une récurrence (2%). Sur les 4 patients qui n'ont pas reçu de prothèse, 3 (75%) ont fait une récurrence après une moyenne de 6 mois (2-10). Si l'on analyse le taux de récurrences sur la base de l'intention de traiter, le résultat est de 7,4%.

Conclusion: Le traitement laparoscopique des hernies incisionnelles est fiable et sans danger. Le taux de complications est peu élevé, il en est de même pour le taux de récurrences également à condition que la prothèse soit mise en place avec succès. Des temps de suivi plus importants sont indispensables.

MOTS CLÉS: Laparoscopie, Hernie Incisionnelle, Traitement par prothèse, Treillis composite.

BIBLIOGRAPHY

- 1 - ANTHONY T., BERGEN P.C., KIM L.T., HENDERSON M., FAHEY T., REGE R.V., TURNAGE R.H.: Factors affecting recurrence following incisional herniorrhaphy.: *World. J. Surg.* 2000, 24 (1), 95-100.
- 2 - BIROLINI C., UTIYAMA E.M., RODRIGUES A.J., Jr., BIROLINI D.: Elective colonic operation and prosthetic repair of incisional hernia: does contamination contraindicate abdominal wall prosthesis use? *J. Am. Coll. Surg.* 2000, 191 (4), 366-72.
- 3 - CHRYSSOS E., ATHENASAKIS E., SARIDAKI Z., KAFETZAKIS A., DIMITRIADOU D., KOUTSOUMPAS V., CHALKIADAKIS G., XYNOS E., ZORAS O.: Surgical repair of incisional ventral hernias: tension-free technique using prosthetic materials (expanded polytetrafluoroethylene Gore-Tex Dual Mesh): *Am. Surg.* 2000, 5 (2), 107-109.
- 4 - FERNANDEZ LOBATO R., MARTINEZ SANTOS C., ORTEGA DEBALLON P., FRADEJA LOPEZ J.M., MARIN LUCAS F.J., MORENO AZCOITA M.: Colocutaneous fistula due to polypropylene mesh.: *Hernia* 2000, 5 (2), 107-109.
- 5 - FOX S.R., FOX K.S., OH K.H.: The gastric bypass for failed bariatric surgical procedures.: *Obes. Surg.* 1996, 6 (2), 145-150.
- 6 - FRANKLIN M.E., DORMAN J.P., GLASS J.L., BALLI J.E., GONZALEZ J.J.: Laparoscopic ventral and incisional hernia repair.: *Surg. Laparosc. Endosc.* 1998, 8 (4), 294-299.
- 7 - GADACZ T.R., CHASE J.A., DUKE S.: Technology of prosthetic material.: *Semin. Laparosc. Surg.* 1994, 1 (2), 123-127.
- 8 - GRANTCHAROV T.P., ROSENBERG J.: Vertical compared with transverse incisions in abdominal surgery.: *Eur. J. Surg.* 2001, 167 (4), 260-267.
- 9 - HENIFORD B.T., PARK A., RAMSHAW B.J., VOELLER G.: Laparoscopic ventral and incisional hernia repair in 407 patients.: *J. Am. Coll. Surg.* 2000, 190 (6), 645-650.
- 10 - HESSELINK V.J., LUIJENDIJK R.W., DE WILT H., HEIDE R., JEEKEL J.: An evaluation of risk factors in incisional hernia recurrence.: *Surg. Gynecol. Obstet.* 1993, 176 (3), 228-234.
- 11 - HIMPENS J.M., LEMAN G.M., DELOOSE K.R.: Technique of introducing large composite mesh while performing laparoscopic incisional hernioplasty.: *Le Jour. de Cœlio-Chir.* 2000, 34, 78-80.
- 12 - HSIAO W.C., YOUNG K.C., WANG S.T., LIN P.W.: Incisional hernia after laparotomy: prospective randomized comparison between early-absorbable and late-absorbable suture materials.: *World J. Surg.* 2000, 24 (6), 747-751.
- 13 - KJOSSEV K.T., LOSANOFF J.E.: Repair of incisional hernias.: *J.R. Coll. Surg. Edinb.* 2001, 46 (3), 191-192.
- 14 - KOEHLER R.H., VOELLER G.: Recurrences in laparoscopic hernia repairs: a personal series and review of the literature.: *JLS* 1999, 3(4), 293-304.
- 15 - KYZER S., ALIS M., ALONI Y., CHARUZI I.: Laparoscopic repair of postoperation ventral hernia. Early postoperation results.: *Surg. Endosc.* 1999, 13 (9), 928-931.
- 16 - LEBER G.E., GARB J.L., ALEXANDER A.I., REED W.P.: Long-term complications associated with prosthetic repair of incisional hernias.: *Arch. Surg.* 1998, 133 (4), 378-382.
- 17 - LEBLANC K.A.: The critical technical aspects of laparoscopic repair of ventral and incisional hernias.: *Am. Surg.* 2001, 67 (8), 809-812.
- 18 - LEBLANC K.A., BOOTH W.V., WHITAKER J.M., BELLANGER D.E.: Laparoscopic incisional and ventral herniorrhaphy: our initial 100 patients.: *Hernia* 2001, 5 (1), 41-415.
- 19 - MONAGHAN R.A., MEBAN.S.: Expanded polytetrafluoroethylene patch in hernia repair: a review of clinical experience.: *Can. J. Surg.* 1991, 34 (5), 502-5.
- 20 - NAVEZ B., ARIMONT J.M., GUIOT P.: Laparoscopic approach in acute small bowel obstruction. A review of 68 patients.: *Hepatogastroenterology* 1998, 45, 2146-2150.
- 21 - OU C.S., PRESTHUS J., BEADLE E.: Laparoscopic bladder neck suspension using hernia mesh and surgical staples.: *J. Laparoendosc. Surg.* 1993, 3 (6), 563-6.
- 22 - PANTON O.N., PANTON R.J.: Laparoscopic hernia repair.: *Am J Surg* 1994, 167 (5): 535-537.
- 23 - PAUL A., KORENKOV M., PETERS S., KOHLER L., FISCHER S., TROIDL H.: Unacceptable results of the Mayo procedure for repair of incisional hernias.: *Eur. J. Surg.* 1998, 164 (5), 361-367.
- 24 - PARK A., BIRCH D.W., LOVRICS P.: Laparoscopic and open incisional hernia repair: a comparison study.: *Surgery* 2000, 124 (4), 816-821.
- 25 - SUGERMAN H.J., KELLUM J. M Jr, REINES H.D., DEMARIA E.J., NEWSOME H.H., LOWRY J.W.: Greater risk of incisional hernia with morbidly obese than steroid-dependent patients and low recurrence with prefascial polypropylene mesh.: *Am. J. Surg.*, 1996, 171 (1): 80-84.
- 26 - TSIMOYIANNIS E.C., TASSIS A., GLANTZOUNIS G., JABARIN M., SIAKAS P., TZOUROU H.: Laparoscopic onlay mesh repair of incisional hernia.: *Surg. Laparosc. Endosc.* 1998, 8 (5), 360-362.
- 27 - VRIJLAND W.W., BONTHUIS F., STEYERBERG E.W., MARQUET R.L., JEEKEL J., BONJER H.J.: Peritoneal adhesions to prosthetic materials: choice of mesh for incisional hernia repair.: *Surg. Endosc.* 200, 14 (10), 960-963.
- 28 - WESTLING A., GUSTAVSSON S.: Laparoscopic vs open Roux-en-Y gastric bypass: a prospective, randomised trial.: *Obes. Surg.* 2001: 11 (3), 284-292.
- 29 - WHITE T.J., SANTOS M.C., THOMPSON J.S.: Factors affecting wound complications in repair of ventral hernias.: *Am. Surg.* 1998, 64 (3), 276-280.

XX^{èmes} JOURNÉES D'ENDOSCOPIE ET DE RADIOLOGIE DIGESTIVES ET OPÉRATOIRES

PARIS - HÔTEL LUTETIA, 31 janvier et 1^{er} février 2002

Président: C. Liguory, Chairman: A. Bitoun

Traitement endoscopique du rgo, Echo-endoscopie, Varices œsophagiennes, Prothèses gastro-duodénales et coliques, Traitement palliatif de tumeurs œsophagiennes et colo-rectales au laser yag, Sphinctérotomie endoscopique, Cholangiographie et pancréatoscopie perorale, Lithotripsie intracorporelle pour calculs biliaires et pancréatiques, Prothèses biliaires ou pancréatiques, Gastrostomie percutanée endoscopique, Hémostase endoscopique, Drainage percutané transhépatique des voies biliaires et cholangioscopie, Coloscopie et polypectomie, Chirurgie laparoscopique.

Organisation: Progress Image, 45 avenue Victor Hugo, Studio 226A - 93534 Aubervilliers Cedex
Tél.: 0033 (0)1 48 11 07 30 - Fax: 0033 (0)1 48 11 07 31 - E.mail: mail@medecine-tv.com