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Laparoscopy and Well-Differentiated Papillary Mesothelioma of the Peritoneum

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1. Introduction

Mesothelioma, is a rare and poorly understood disease that arises from mesothelial cells lining serous cavities. From a histopathologic point of view there are epithelial, connective tissue and mixed varieties. Although commonly found in the pleura, the peritoneum is involved in 20-40% of cases.¹⁻⁵

Well-Differentiated Papillary Mesothelioma of the Peritoneum (WDPMP) is a type of epithelial mesothelioma which typically shows benign biological behavior,⁶⁻¹² although several cases with a more aggressive form have been reported.¹³⁻¹⁸ Being uncommon, it lacks of specific clinical and radiological manifestations,¹⁹⁻²¹ and it is difficult to obtain precise information regarding its natural history and optimal management. The diagnosis is challenging and the delay is a component of the clinical picture of these patients. This chapter evaluates the applicability of laparoscopy when this entity is suspected.

2. Diagnosis

There is nonspecific presentation for peritoneal mesothelioma and the clinical diagnosis is difficult. Symptomatology is insidious, undefined and unspecific, but it can appear as a surgical emergency,²²⁻²³ although usually the disease is diagnosed incidentally during a laparoscopy, done for another other reason. Generally, the patient with peritoneal mesothelioma shows up with one or two types of symptoms and signs: those with abdominal pain, usually localized and related to an abdominal mass with little or no ascites and those, without abdominal pain, but with ascites and distension.²⁴ A history of asbestos exposure is common in patients with pleural mesothelioma, but this association has not been firmly established in the case of the peritoneal mesothelioma.²⁵

One of the clinical poorly understood aspects of this disease is the low diagnostic yield of the cytologic analysis of ascites. In a study of 51 patients with peritoneal mesothelioma, Sugarbaker et al²⁶ found that only two patients had a definitive diagnosis established by paracentesis of the intrabdominal fluid and the cytology. The analysis of the ascitic fluid usually reveals an exudative process, varying from clearly, mucinous or serohematic. The cytology can be diagnostic in approximately 80% of cases with an adequate sample, but it has to be related to an abdominal mass.²⁷ In some cases it has been reported to be useful for

the diagnosis of Well-Differentiated Papillary Mesothelioma.²⁸⁻²⁹ No tumor marker is reliable for diagnosis.

Peritoneal Mesothelioma does not have specific radiological characteristics. Therefore, a precise diagnosis based on imaging findings alone is not possible; in addition, distinguishing between benign and malignant processes, as well as primary and metastatic processes is also difficult (Figure 1). Lovell et al¹⁹ found that the Computed Tomography Scan is clearly superior to the ultrasound, specifically detecting small tumoral nodules and mesenteric or peritoneal thickening. The Tomography can reveal a peritoneal enhancing soft-tissue mass within the mesentery, omentum or peritoneum thickening, multiple small nodules surrounding the peritoneum, mesentery and omentum. Other findings include ascites, infiltrating mass involving the serous of the bowels, direct invasion within the liver, spleen and abdominal wall, retroperitoneal adenopathies and metastasis at distance.³⁰ The pelvic involvement can suitably be evaluated by ultrasound as well as a small amount of liquid at cul-de-sac.¹⁹ Few data has been published about the magnetic resonance imaging and PET-CT imaging manifestations. Due to no specificity in clinical characteristics and the low trust of the conventional techniques in the diagnosis of mesothelioma, the laparoscopic surgery will allow assuring the definitive diagnosis and nowadays it is preferable to laparotomy, due to lower invasiveness. Application of diagnostic laparoscopy allows direct visualization of the abdominal-pelvic peritoneum and organs, and may disclose laparoscopic characteristics, which beside the direct vision biopsy allows the diagnostic accuracy of this uncommon medical entity.

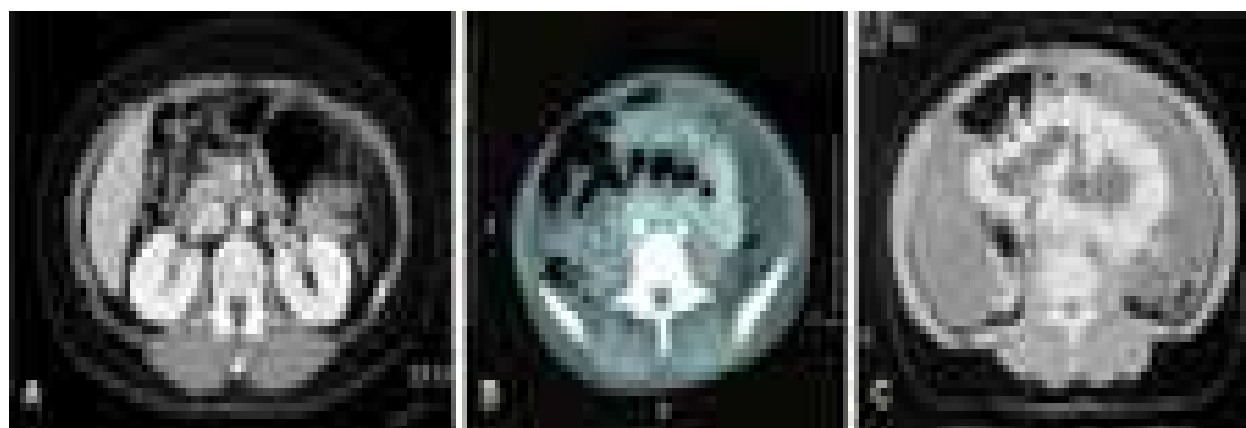


Fig. 1. Axial Contrast Abdominal-Pelvic Computer Tomography shows multiple round nodules and mesenteric and peritoneal thickening and ascites. A. WDPM (courtesy of Dr. Hyuong Sun Jang and Ki Young Ru), B. Peritoneal Carcinomatosis, C. Peritoneal Tuberculosis (courtesy of Dr Suárez-Grau and Dr Morales-Conde).

3. Laparoscopic surgery

The first case of peritoneal mesothelioma, involving the laparoscopic surgery and the peritoneal biopsy, was published in 1974.³¹ Nowadays the diagnostic laparoscopic surgery offers a fast, safe and less invasive form to confirm the diagnosis of peritoneal mesothelioma. We must consider the laparoscopic approach as the main technique for correct visualization of the peritoneal cavity, peritoneal fluid and multiple peritoneal biopsies obtained from intra-abdominal locations, to diagnose a multitude of

gastrointestinal diseases showing abdominal pain and ascites of unknown etiology. Yoon et al³⁹ reported a diagnostic yield of 87.2% for diagnostic laparoscopy in patients with ascites of unknown origin. Piccigallo et al⁴⁰ reported the correct diagnosis using the laparoscopic surgery and the histological examination of biopsy specimens, reaching a percentage of diagnostic security near 90%, in patients diagnosed with Malignant Peritoneal Mesothelioma. In patients with Well Differentiated Papillary Mesothelioma of the Peritoneum the laparoscopic surgery reduces the period of observation and for that reason, the repetition of examinations and other explorations, as well as avoiding the inherent complications related to laparotomy, with a more comfortable post-operative evolution by the smaller surgical trauma. Accurate diagnosis allows a precise therapy to be promptly started. The majority of authors recommend multiple biopsies with or without adjuvant therapy, instead of an extensive surgery due to its low malignant potential. We reported a case of WDPMP showing its resolution after adjuvant chemotherapy.⁴¹

Diagnostic laparoscopic surgery is useful for staging pleural mesothelioma⁴² (although only two cases of Well Differentiated Papillary Mesothelioma, involving the peritoneal and pleural cavities, have been published).¹⁶⁻⁴³ In cases of isolated pelvic nodules it can provide anatomic information, allows definitive management and pathologic diagnosis, therefore, to diagnose and treat WDPMP the laparoscopic approach can be used effectively and safely.^{21,44}

3.1 Surgical technique

The diagnostic laparoscopic surgery can be done under general anesthesia or under local anesthesia and sedation. The table essentially will be moved into: steep anti-Trendelenburg + left tilt, anti-Trendelenburg + right tilt, steep Trendelenburg + left tilt, steep Trendelenburg + right tilt during the examination to mobilize the ascitic fluid and the intestine. The surgeon and assistants are positioned on the patient's left side. The monitor is placed right to the patient's head. The normally used instrument is a rigid endoscope with the optic connected to a cold light source, of 5 mm with a forward viewing angle of view of 0° and oblique viewing of 30°. For the exploration of the peritoneal cavity, it is necessary to create a suitable pneumoperitoneum that is induced by CO₂ insufflation, an intraabdominal pressure of 10 to 12 mm is the adopted to secure a good vision. At the same time there it is introduced a supra or transumbilical trocar and the laparoscope is passed through it, inspecting the peritoneal cavity. A second and third trocar (10 mm and 5 mm, respectively) can be positioned under visual control for biopsy and introduction of accessory instruments, according to the particular requirements in each case. In order to avoid complications, it is recommended to follow carefully a entry procedure technique due to adhesions between the small bowel loops and the abdominal wall. We use a blunt tip trocar described by Hasson,⁴⁵ to enter the abdominal cavity, a small incision must be done under direct vision and the aponeurotic hole has to be adjusted by stitches to the Hasson trocar to avoid pneumoperitoneum leaks.

3.2 Abdominal cavity exploration

Begin the exploration with the table in horizontal position. The presence of ascites in abdominal cavity is evaluated and its characteristics. Cytology and bacteriology samples should be taken under direct vision and finally the ascites should be completely emptied. The situation and degree of alterations must be defined.

Then, the laparoscopic exploration must follow a defined systematic plan, covering the different quadrants of the cavity (Figure 2).

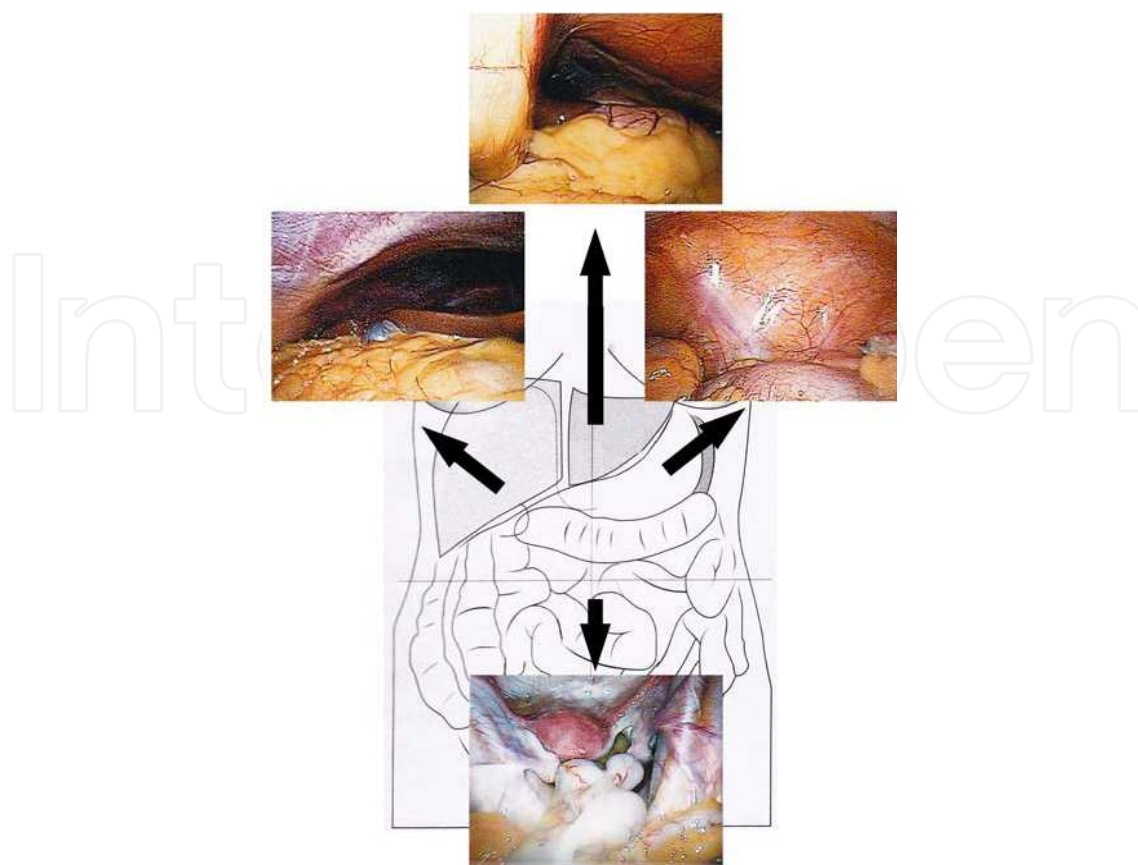


Fig. 2. Laparoscopic Exploration

Henning and Look⁴⁶ described four positions that allow a good vision of the entire peritoneal cavity; such positions can be modified according to the particular requirements of each case. In position I, it turns the table slightly ($15-20^{\circ}$) towards the left and raise to the head other $15-20^{\circ}$. Being the explorer to the left of the patient, the laparoscope is introduced towards the right hypochondrium, which allows to observe the gallbladder, the hepatic edge, the surface of the right lobe and right side of the falciform ligament. The rotation of the optics, the variation of the intensity of the position or the cephalic elevation of the table provides a vision of the entire region.

Position II is the same as I, but laparoscope moves under the round ligament, until reaching the left hypochondrium. If the light goes towards the right, the left hepatic lobe could be observed, the left side of the falciform ligament and the diafragn. If it goes towards the left side, it could see the anterior face of the stomach and the epiploic fat.

Position III is achieved changing the position towards the right side (45°) and lifting the head on the exploration table (40°), with the surgeon at the right side. In this case, the spleen, the frenic and colonic ligament, good part of the anterior face of the stomach, including fornix and possibly, also the esofagic hiatus can be seen, if the gastrohepatic ligament allows it.

Position IV is to inspect the inferior quadrants (pelvic region) and the rest of intraabdominal organs. This position requires the Trendelenburg's position, turning the table towards the side that we wish to explore. The changes from one position to another require a lateral displacement of the optic, which always must be done in the sense of the iluminated field, to avoid tears of adhesions. In this case, the monitor should be placed down and to the right side of the patient.

3.3 Laparoscopic findings

WDPMP, due to its rarity the surgeons are usually not sensitive with the disease. Laparoscopic findings of mesothelioma are indistinguishable of peritoneal tuberculosis, metastatic adenocarcinoma or primary tumour of the mesentery, from the gross standpoint, the common presentation sign of peritoneal nodules in WDPMP may lead to confusion during the diagnostic laparoscopic surgery, therefore a diagnosis is frequently difficult. However, the increased use of laparoscopic surgery to identify pathologic causes of ascitis of unknown origin, as well as pelvic pain, particularly in young women, which implies that the surgeons must be conscious of the laparoscopic characteristics of this tumor and distinguished from other common neoplasms involving the peritoneum to be enabled to properly recognize and treat the tumor.

The laparoscopic features of the Peritoneal Mesothelioma, are:⁴⁰

- a. The presence of homogeneous spreading of nodules, plaques or masses on both parietal and visceral peritoneum (Figure 3). The nodules become more confluent plaque like masses and eventually omental span is observed with the progression of the disease ⁴¹(Figure 4).

The nodules usually are:

- Heterogenous size: The size of nodules is variable. Most of them appeared to be in the range of 0.5 cm to 2.0 cm, located in the abdomen and pelvis.¹⁸ If they appear under the form of a fine dissemination to miliar, therefore they can simulate the typical aspect of the tuberculous elements.⁴⁷ They can one or multiple be distributed by the totality of the peritoneal cavity, omentum and mesentery. Occasionally, small foci of tumor are present in the surface of the ovary¹⁸(Figure 5).
- White color.
- Firm consistency.



Fig. 3. Laparoscopic view of tumor whitish nodules on parietal peritoneum (courtesy of Dr. Hyuong Sun Jang and Ki Young Ru)

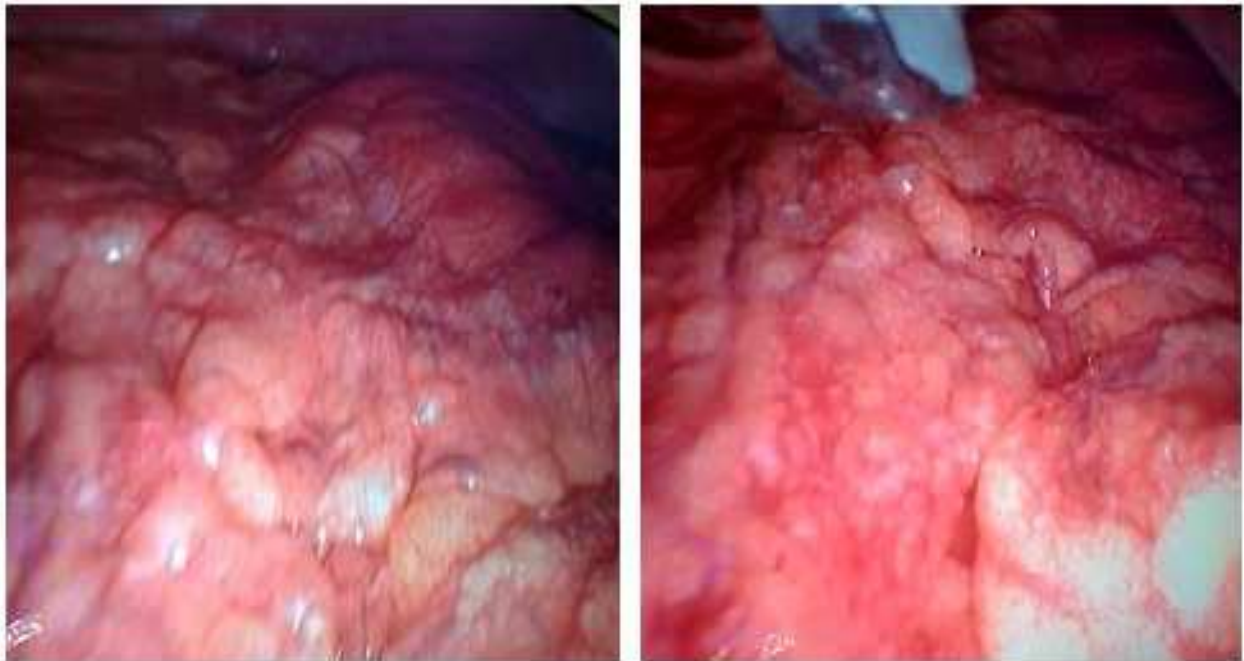


Fig. 4. Laparoscopic view of omental "caking" due to confluent nodules.



Fig. 5. Laparoscopic view of multiple nodules in the ovarian surface (courtesy of Dr. Hyuong Sun Jang and Ki Young Ru).

- b. The absence of direct or indirect signs of other abdominal neoplasms.
- c. The absence of hepatic metastases or the possible presence of nodules or plaques on Glisson's capsule without parenchyma involvement. Just in the advanced states of the disease, the tumor infiltrates the capsule of the liver with later extension within the parenchyma and retroperitoneal structures.
- d. Ascites is practically constant and is variable in color from yellowish to cloudy to bloodstained. The ascitic fluid is usually serosanguinous or grossly blood-stained, but does not constitute a definitive diagnosis of peritoneal tumor.
- e. Little hyperemia that extends to all the peritoneum. It serves to the gross differentiation criterion of the inflammatory form, where the parietal peritoneum is erythematous.
- f. The presence of adhesions between the intestinal loops and the abdominal wall, that is typical of active tuberculosis, can in addition be seen in mesothelioma. In the case of Tuberculosis, when entering the cavity a multitude of adhesions between the different abdominal organs are present, emphasizing the hepatic adhesions⁴⁷ (Figure 6).



Fig. 6. Laparoscopic view of Peritoneal Tuberculosis: numerous small yellow-white nodules on the parietal peritoneum and adhesions (courtesy of Dr Suárez-Grau and Dr Morales Conde)

3.4 Biopsy

The laparoscopic surgery, in comparison with its diagnostic effectiveness, goes naturally considered as a whole and therefore not only with the inspection of the abdominal cavity, but with the biopsy for the histological diagnosis it is of extraordinary effectiveness⁴⁸ adding diagnostic accuracy, due to the following reasons:

- It can be done on several organs: Multiple biopsies of the parietal peritoneum, diaphragm, omentum and lesion of the pelvic cavity.
- It comes often on the guide from the laparoscopic, reason why it is of particular importance when the injuries are unique. The biopsy must be taken near the edges close to the nodule and the peritoneum in order to avoid the central necrosis.
- The site of the biopsy is not forced as by the transcutaneous biopsy; it can be taken with direct vision.
- The histological fragment has the sufficient quality to assure the most precise examination (Figure 7).

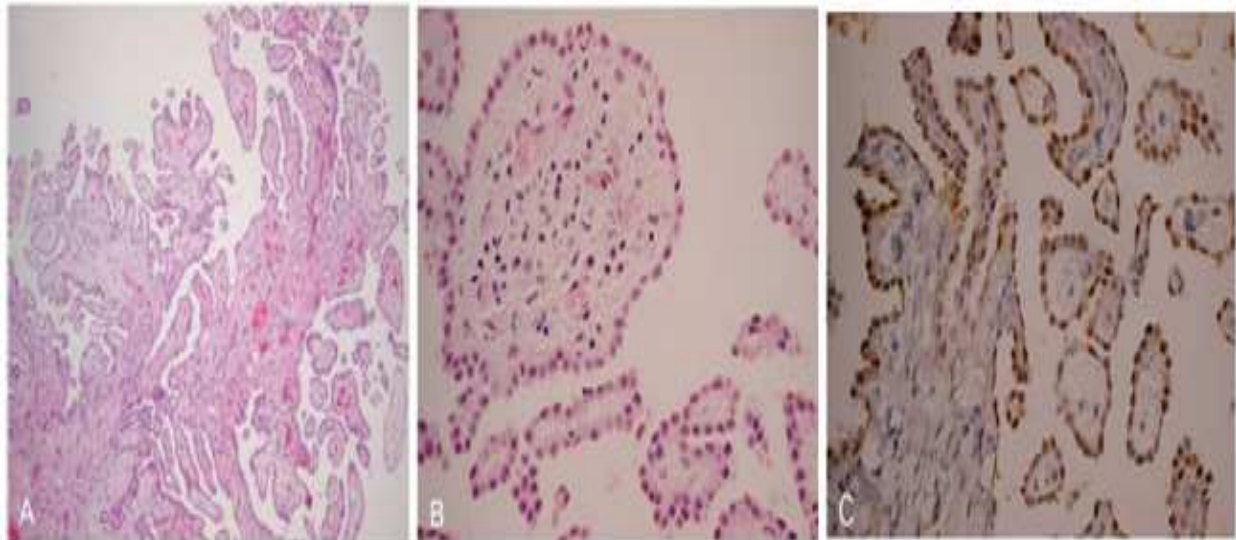


Fig. 7. Well-differentiated Papillary Mesothelioma of Peritoneum Microscopic Findings. A. Well-developed papillae lined by uniform mesothelial cells with minimal cytologic atypia. B. Neoplastic mesothelial cell shows strong positive staining for Cytokeratins. C. Immunohistochemical staining for Calretinin.

3.5 Complications

3.5.1 Tear of Adhesions

In some cases the adhesions are present, the small intestine loops tightly adherent to abdominal wall, with a careful open technique using a Hasson trocar to enter the abdominal cavity, these complications are rare. Beside, the substitution of the view field by a red veil indicates that the window of the optics has been applied on the small intestine or the adhesion; in these cases avoid to continue the movement, because it could originate a tear of the adhesions.

3.5.2 Hemorrhage

The observation of the biopsy site is a fundamental requirement to avoid any type of haemorrhagic complication. The laparoscopic biopsy is practically risk free, due to the use of coagulation to form a clot or by positioning fibrin dressings.

3.5.3 Port-site metastases

Recurrences at the insertion site of the laparoscope or other instruments for malignant mesothelioma as well as WDPMP have been reported, this source of disease usually progresses fast compared to the intraabdominal component and requires extensive surgery for the local control.^{13,22,38,49} The aggressive nature of such recurrences is evident. According to Sugarbaker,²⁷ any invasive procedure used to establish the diagnosis of mesothelioma, including the paracentesis, should be carried out with great precaution and they recommend that paracentesis or laparoscopic surgery should be carried out along the midline of the abdominal wall, allowing the port site and the needle tract to be excised as part of the cytoreductive surgery.

4. Conclusion

Well-Differentiated Papillary Mesothelioma is an entity rarely observed and difficult to diagnose. Laparoscopy with biopsy under direct vision is an accurate and safe technique to confirm the diagnostic.

5. Acknowledgment

We acknowledge Fritz Dorries for his expert assistance in the preparation of the manuscript.

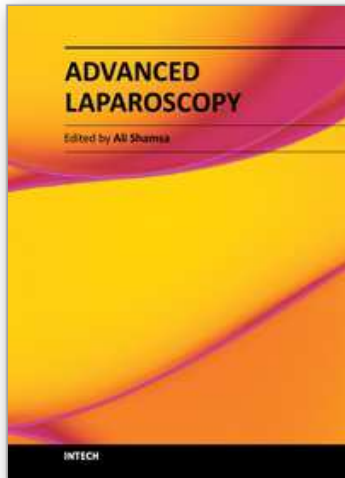
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Advanced Laparoscopy

Edited by Prof. Ali Shamsa

ISBN 978-953-307-674-4

Hard cover, 190 pages

Publisher InTech

Published online 30, September, 2011

Published in print edition September, 2011

The present book, published by InTech, has been written by a number of highly outstanding authors from all over the world. Every author provides information concerning treatment of different diseases based on his or her knowledge, experience and skills. The chapters are very useful and innovative. This book is not merely devoted to urology sciences. There are also clear results and conclusions on the treatment of many diseases, for example well-differentiated papillary mesothelioma. We should not forget nor neglect that laparoscopy is in use more extensively than before, and in the future new subjects such as use of laparoscopy in treatment of kidney cysts, simple nephrectomy, pyeloplasty, donor nephrectomy and even robotic laparoscopy will be researched further.

How to reference

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María Eugenia Aponte-Rueda, Ramón Saade-Cárdenas and Salvador Navarrete-Aulestia (2011). Laparoscopy and Well-Differentiated Papillary Mesothelioma of the Peritoneum, *Advanced Laparoscopy*, Prof. Ali Shamsa (Ed.), ISBN: 978-953-307-674-4, InTech, Available from: <http://www.intechopen.com/books/advanced-laparoscopy/laparoscopy-and-well-differentiated-papillary-mesothelioma-of-the-peritoneum>

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