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Thoracoscopic Left Splanchnicectomy – Role in Pain Control in Unresectable Pancreatic Cancer. Initial Experience

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Rezumat

Splanhnicectomia stângă pe cale toracoscopică – rol în controlul durerii din cancerul pancreatic nerezecabil. Experiența inițială

Obiective: Managementul sindromului hiperalgic visceral opioid dependent din cancerul de pancreas nerezecabil rămâne încă o mare provocare terapeutică. Obiectivul lucrării a fost acela de a evalua siguranța și eficiența splanhnicectomiei unilaterale stângi realizată pe cale toracoscopică în controlul durerii la o primă serie de 15 pacienți cu tumori pancreatice nerezecabile.
Pacienți și metodă: Cincisprezece pacienți cu cancer pancreatic nerezecabil (std. III și IV) și sindrom hiperalgic abdominal au beneficiat de splanhnicectomie stângă toracoscopică. Toți pacienții au completat chestionarul Wong-Baker pentru evaluarea severității durerii prezentând un nivel algic preoperator cu valori între 7 și 9.
Rezultate: Durata intervenției a variat între 30 min și 1 oră. Drenajul pleural a fost suprimat la 24 ore postoperator. Nu au existat complicații și decese. Evaluarea durerii postoperator la 24 ore a arătat o scădere semnificativă a acesteia la toți pacienții, cu valori pe scala durerii cuprinse între 0 și 2, nivel ce s-a menținut și la controlul efectuat la o lună de la intervenție.
Concluzii: Splanhnicectomia unilaterală stângă pe cale toracoscopică poate ameliora semnificativ durerea și calitatea vieții în cazul pacienților cu cancer pancreatic nerezecabil.

Cuvinte cheie: cancer, durere, toracoscopie, splanhnicectomie

Abstract

Background: The management of opiate-dependent intractable abdominal pain caused by unresectable pancreatic cancer remains challenging. The aim of this study was to evaluate the safety and efficacy of thoracoscopic unilateral left splanchnicectomy for pain control in a first series of 15 patients with unresectable pancreatic cancer.
Patients and Methods: Fifteen patients suffering from intractable pain due to unresectable pancreatic cancer (stage III and IV) underwent thoracoscopic unilateral left splanchnicectomy. To assess pain severity and the impact of this palliative procedure for pain relief, all patients completed Wong-Baker Faces Pain Rating Scale with a preoperative pain degree between 7 and 9.
Results: Surgical intervention duration varied from 30 minutes to 1 hour. Pleural drainage tube was removed 24 hours postoperatively. There were no complications nor deaths. Immediate pain relief (pain degree 0–2) was achieved in all patients after thoracoscopic unilateral splanchnicectomy, same level being registered at first check-up after one month.
Conclusions: Thoracoscopic unilateral left splanchnicectomy decreases the pain substantially and significantly improves the quality of life in patients with unresectable pancreatic cancer.

Key words: cancer, pain, thoracoscopy, splanchnicectomy

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Introduction

Pain is the most distressing feature of pancreatic cancer. Many methods have been advocated for its control, ranging from the use of narcotic analgesics to celiac plexus block (1) and operation. The sympathetic pancreatic innervation constitutes the main pathway for the afferent transmission of pancreatic pain. Anatomical interruption can be done at the level of the celiac plexus or at the level of the splanchnic nerves. Worsey and colleagues (2) reported first in 1993 thoracos-copic left splanchnicectomy to relieve pain. Thoracoscopic splanchnicectomy is a palliative procedure for the management of upper abdominal pain from unresectable pancreatic cancer. This procedure is performed under direct vision and it is an alternative to celiac plexus block with a higher degree of precision and with less associated morbidity. Thoracoscopic splanchnicectomy consists in identification and division of all the roots of the splanchnic nerves from T5 to T10. This procedure can be repeated contralateral in case of recurrence of pain or it can be performed bilaterally from the beginning. (3,4)

Anatomy

Thoracic splanchnic nerves conduct pain sensation from the abdominal organs around the celiac ganglion. Analysing the anatomy of thoracic splanchnic nerves for surgical resection on dissected human posterior thoracic walls Yang HG et al. showed that the greater splanchnic nerves (GSNs) were formed by nerve branches from the T4-T11 thoracic sympathetic ganglia and the most common type was formed by T5-T9 (21.7%). The uppermost branches originated from T4-T9 while the lowermost branches emanated from the T7-T11. Two to seven ganglia contributed to the GSNs. The lesser splanchnic nerves (LSNs) were formed by the nerve branches of the T8-T12 thoracic sympathetic ganglia and the most common type was formed by T10 and T11 (32.6%). The least splanchnic nerves (lSNs) were composed of branches from the T10-L1 thoracic sympathetic ganglia and the most common type was composed of nerve branches from T11 and T12 or from T12 only (each 30.4%). In 54.3% of the specimens, interconnection between the GSNs and the LSNs existed, bringing the possible bypass around the transection of the GSNs. (5)

Patients and Methods

We reviewed 15 patients who had been operated on by the same team of surgeons. We started performing this procedure in October 2008, and it was done for 15 consecutive patients until September 2013. There were 11 men and 4 women. Mean age was 63 years, with patient ages ranging from 44 to 76 years. All patients were at an advanced stage of pancreatic cancer: 9 patients were stage III and 6 were stage IV with liver metastases in 4 cases and peritoneal carcinosis in 2. A number of 8 patients had unresectable pancreatic cancer that did not necessitate a decompression operation. Six patients had undergone one previous operative procedure: gastroenterostomy and choledoco/colecisto-enterostomy, and in one case a biliary stent was endoscopically introduced for jaundice. Duration of pain at the time of splanchnicectomy ranged from 1.5 to 4 months (mean, 2 months). Pain was periumbilical and epigastric in all patients, with radiation to the flank in 8 patients (right, 2; left, 4; both, 2) and to the back in 10 patients. Pain was limited to the epigastric region without any radiations in only 3 patients. Pain was excruciating and debilitating in all patients. Preoperative pain assessment was done using the Wong-Baker Faces Pain Rating Scale – *Fig. 1*. (6) This scale is often helpful for patients with any degree of education, being very easy to understand and to answer. It uses faces from happy to tearful to demonstrate how a person might be feeling. Each patient received before and after the surgical intervention a card with these faces and were asked to choose the face that best describes how he/she is feeling. The patients marked the pain level accordingly. All 15 patients received narcotic analgesic injections, became opiate dependent, and were having a poor quality of life with severe impairment and limitations of daily life activities. Preoperative pain level was 6 – 9 with a median level of 8. We studied the effect on pain level of left splanchnicectomy performed by thoracosopic approach. We appreciated the response to this palliative procedure for the management of upper abdominal pain from unresectable pancreatic cancer by using again the Wong-Baker Faces Pain Rating Scale.

Operative procedure

All procedures were performed with the patient in the right lateral decubitus position with slight tilt anteriorly, exposing

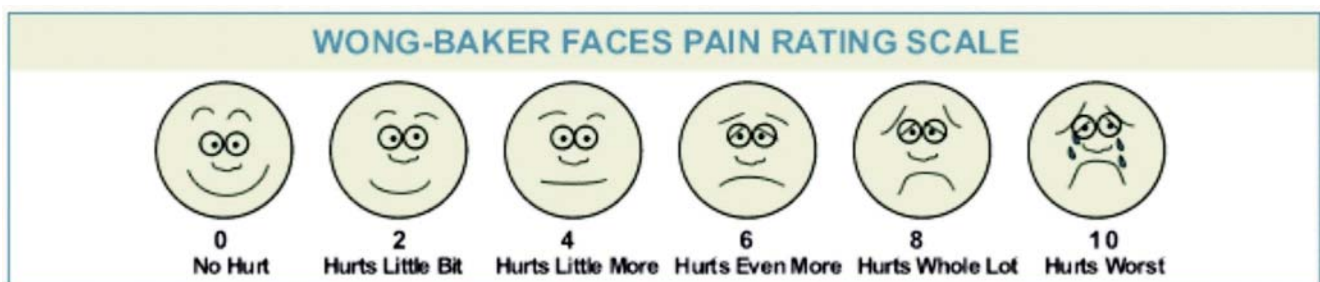


Figure 1. *Wong-Baker faces pain rating scale*

the left thorax. General anesthesia was established with double-lumen endotracheal intubation and single-lung ventilation. In 5 patients we did not have selective intubation and we used CO2 insufflation. The key point of our operations was intrathoracic carbon dioxide insufflation to a pressure level of 8-10mmHg, which allows a better exposure and a more distal division of the greater splanchnic nerve and lesser splanchnic nerve.

Three trocar ports were used in all cases (*Fig. 2*).

Trocar port placement was as follows: optic trocar (10 mm) through VIIth intercostal space on midaxillary line, two working trocars of 5 mm – one through Vth intercostal space on anterior or midaxillary line and one through IXth intercostal space on posterior axillary line. We used the standard thoracoscopic kit, with a 00 optical angle videoscope, hook cautery, scissor and an atraumatic grasper. The surgeon stands in front of the patient with the assistant on his right side.

Working trocar insertion was done under direct vision. Identification of splanchnic nerves (GSN – T5-T9/10 and LSN – T9/10-T10/11) through the transparency of the parietal pleura down to the diaphragm was easy in 10 cases. (*Fig. 3*)

In 5 patients we encountered pleural adhesions which required careful dissection with the Hook cautery. (*Fig. 4*)

The Greater Splanchnic Nerve was identified through the parietal pleura from its first root along the descending aorta, to the diaphragmatic recess. To expose the trunk of the GSN, a pleural incision using hook electrocautery was made in the region between the descending aorta and the sympathetic trunk. Pleurotomy from the fifth intercostal space to the diaphragmatic recess was then performed. The main trunk of the GSN was isolated using blunt dissection as distally as possible and sectioned using electrosurgical scissors. The Lesser Splanchnic Nerve was in some cases identified laterally to the GSN, dissected and sectioned. The excised nerves were sent for pathological examination. (*Fig. 5*).

We finished the operation with a pleural drainage with a chest tube of 20F connected to water seal. In most cases the chest tube was kept in place only for the first 24 hours. In 3 cases patients needed prolonged drainage because of persistent pneumothorax and lack of pulmonary total expansion. (*Fig. 6*)

After controlling the hemostasis, the lung is reinflated by the anesthesist, and the trocars are removed and the chest wounds are closed. Surgical intervention duration varied from 30 minutes to 1 hour. The surgical procedure has a short learning curve, the operating time decreasing rapidly from 1 hour to less than 30 minutes. A postoperative chest X-ray is performed routinely for all patients at 24 hours postoperatively.

Results

There were no postoperative complications nor deaths after this procedure. Hospital stay ranged from 2 to 9 days (mean, 6.7 days). Pain was totally relieved and drug addiction stopped. Some patients of the early cases experienced postoperative pain at the site of the trocars so we decided to inject locally lidocaine 1% at the end of the surgical procedure. Pain level was assessed at 24 hours postoperatively and the results were good with pain level ranging from 0 to 2 on Wong-Baker Faces Pain Scale. Results remained good at one month control. Recurrence of pain of low intensity was observed in 4 patients

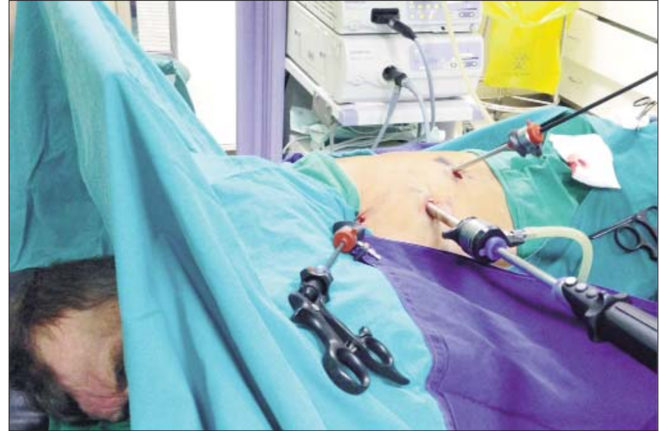


Figure 2. *Patient position and trocar port placement*

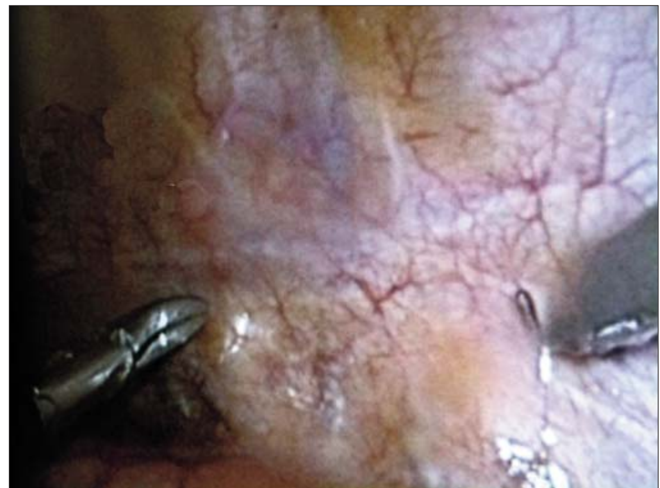


Figure 3. *Identification of GSN through the transparency of parietal pleura*

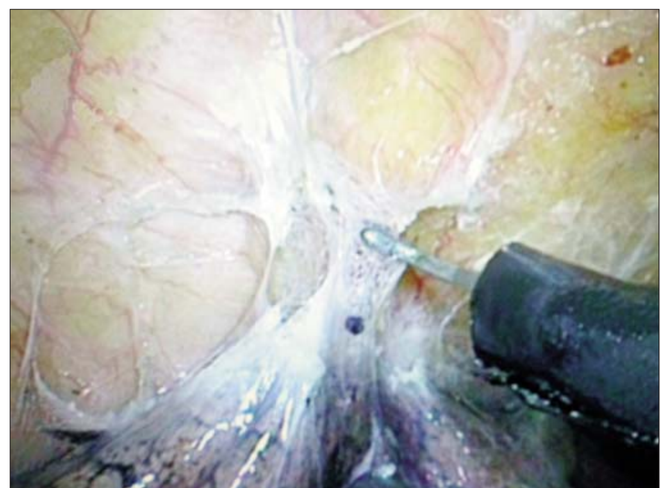
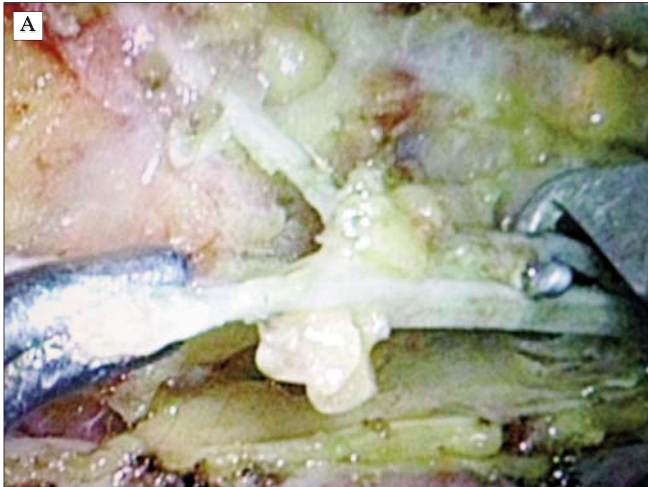


Figure 4. *Dissection of pleural adhesions*



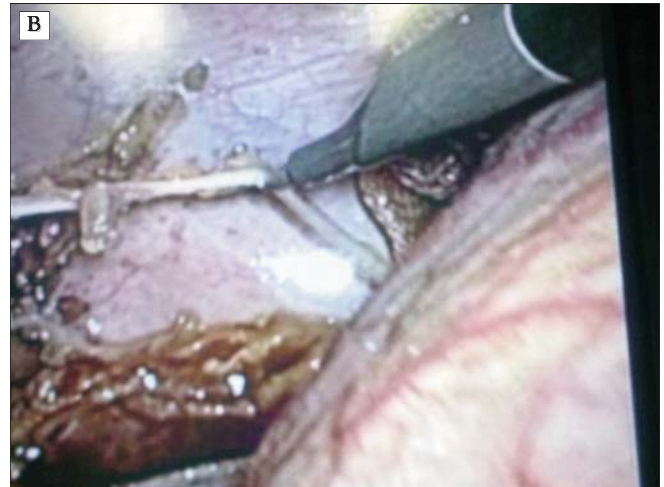


Figure 5. *Dissection of GSN and LSN*

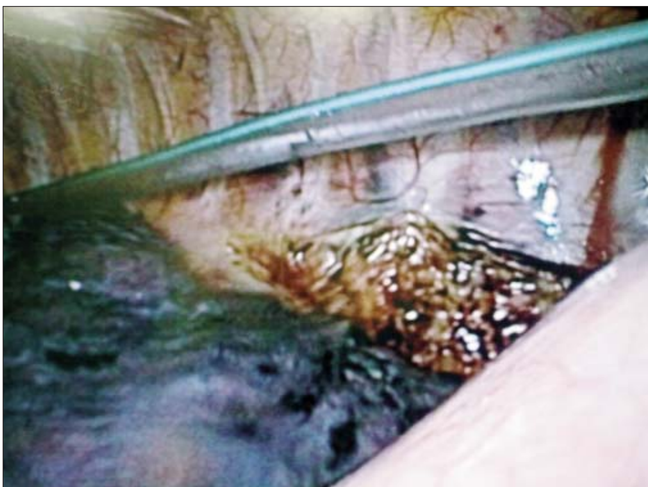


Figure 6. *Pleural drainage*

with liver metastases and peritoneal carcinosis.

In our first series of 15 cases, thoracoscopic left splanchnicectomy proved itself as a good method of pain control in unresectable pancreatic cancer.

Discussions

The first left splanchnicectomy was performed in 1942 by Mallet-Guy (7) through laparotomy in order to alleviate intractable pain due to chronic pancreatitis. In 1990, Stone and Chauvin (8) first reported the clinical results of splanchnicectomy by thoracotomy. In 1993 Worsey et al. (2) described the use of videothoracoscopy to perform a left splanchnicectomy in patients with intractable pain due to advanced pancreatic cancer. The technique described by Worsey consisted in identification and division of all roots of the splanchnic nerves, from T5 through T11. An easier and faster procedure was proposed by Pietrabissa et al. (9) consisting in dividing only the main trunk of the greater and lesser splanchnic nerves with the same good results. Recently, many authors have reported good results with thoracoscopic unilateral left splanchnicectomy for pancreatic pain relief. (2,3,4,10) However, there is still no general consensus on whether thoracoscopic splanchnicectomy should be performed on the left side only or bilaterally from the beginning. Some authors recommend that thoracoscopic splanchnicectomy be routinely performed bilaterally to obviate the need for a second procedure if pain recurs, but this bilateral approach has some side effects such as transient orthostatic hypotension or diarrhea. (11) Life expectancy in these patients with advanced pancreatic cancer is very short and most of them die shortly after the procedure before they need a second procedure if any pain recurs. In our study, a thoracoscopic unilateral left splanchnicectomy procedure was performed with immediate good results consisting in a major relief of pain in our patients. The advantages of the technique consist in higher precision video assisted identification and division of the splanchnic nerves and the use of CO2 insufflation allows us to perform the intervention even without selective double-lung ventilation to create the working space. The limitations include difficulty created by strong pleural adhesions and the likelihood that pain relief reduces with increased period of survival in cancer patients. Whether unilateral procedure is sufficient or neurotomies would depend on the side of pain radiation, whether denervation of the nerve roots or just the splanchnic nerve is sufficient are questions to be answered in the future, but certainly the procedure is a valuable attempt to provide palliation in patients. (12) This procedure has been reported with either few or no complications. Kordiak et al. (13) in a study of 31 patients reported no complications of thoracoscopic splanchnicectomy surgery in any of the study patients within the observation time period and stated its use as current palliative analgesic therapy. The patients referred for palliative surgery have on an average 6 months survival time, and subjecting them for procedures that can become an important source of morbidity is not justified.

Conclusions

Thoracoscopic left splanchnicectomy is an effective and safe minimally invasive procedure with good results in the pain control in hyperalgic syndrome from unresectable pancreatic cancer. Necessitating a short hospital stay and having a short learning curve this procedure could become highly accepted among patients and surgeons as treatment of choice of intractable pancreatic pain.

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