Splanchnicectomy for the treatment of intractable abdominal pain

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IN selecting a procedure for the relief of abdominal pain due to disease for which there is no medical or surgical cure, the neurosurgeon frequently overlooks the advantages of splanchnic and sympathetic denervation of the upper abdominal viscera. This report is an evaluation of 39 splanchnicectomies done for intractable abdominal pain in the years 1950 through 1965 at the Cleveland Clinic Hospital (*Fig. 1*). The results have been evaluated in two groups, procedures performed for: (1) nonneoplastic disease, and (2) neoplastic disease (*Table 1*). Nearly half the cases are in each category, 17 for benign, and 22 for neoplastic disease. The surgical technic and the neuroanatomic and neurophysiologic bases for the procedure are briefly discussed.

SURGICAL TECHNIC

The procedure is performed according to the method described by Peet[1] in 1935. An incision is made at the eleventh rib to expose the extrapleural space and the lower thoracic ganglia and intervening trunk. The greater splanchnic nerve, together with the lesser and least splanchnic nerves, is resected as extensively as possible. This is performed with ease bilaterally in one stage.

With the patient prone, a paramedian incision is centered over the eleventh rib (*Fig. 2*). The proximal 5 inches of the eleventh rib is resected and the pleura is separated from the lateral margin of the vertebral column, the lower ribs, and the costal articulations. The ganglionated chain is then identified as it runs across the costovertebral articulations (*Fig. 3*). This chain is excised between silver clips at or in the substance of the diaphragm and above the ninth vertebral ganglia, a portion that includes the origin of the minor splanchnic nerve.

The greater splanchnic nerve, which usually is more deeply situated on the anterolateral portion of the vertebral bodies than the ganglionated chain, is then clipped and divided as it penetrates the diaphragm just above the celiac ganglion. The nerve trunk is then dissected upward, and as long a segment as possible is removed. With this exposure there is no difficulty in re-

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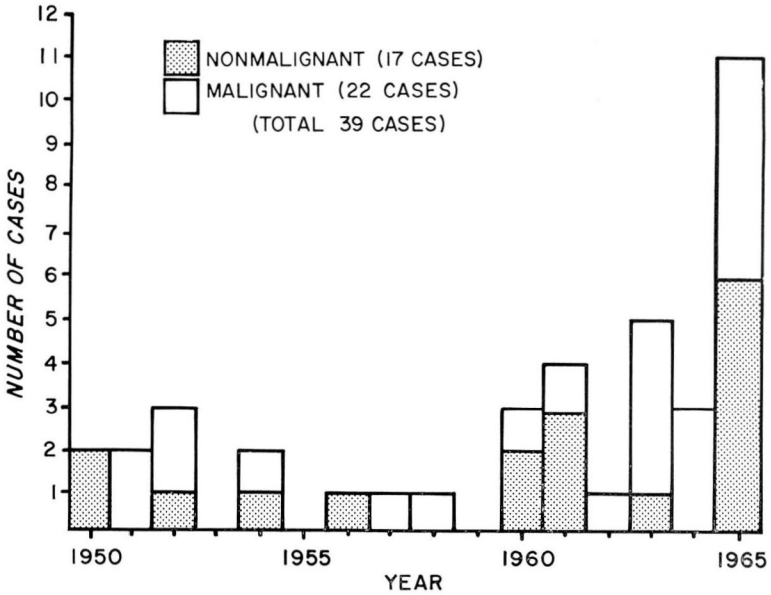

Fig. 1. Graph showing the distribution of 39 splanchnicectomies at the Cleveland Clinic Hospital 1950 through 1965.

Table 1.—*Primary cause of intractable abdominal pain in 39 patients who underwent splanchnicectomy*

Group	Disease	Patients, number
1	Nonneoplastic disease (17)	
	Chronic relapsing pancreatitis	9
	Biliary dyskinesia	4
	Abdominal pain (origin not determined)	4
2	Neoplastic disease (22)	
	Carcinoma of pancreas	15
	Carcinoma of stomach	3
	Carcinoma of lung	1
	Hepatoma	1
	Reticulum cell sarcoma	1
	Teratoma of abdomen	1

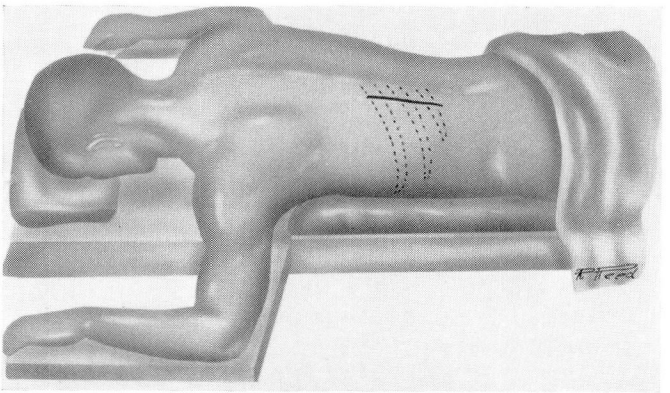

Fig. 2. Drawing illustrating the surgical position and location of the paramedian incision centered over the eleventh rib.

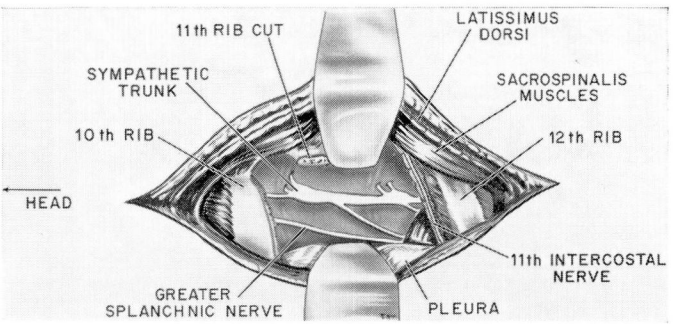

Fig. 3. Drawing showing anatomic relationships at retropleural supradiaphragmatic sympathectomy and splanchnicectomy.

secting the sympathetic chain from the ninth to the eleventh ganglia—a resection of sufficient extent to prevent regeneration.[2]

RESULTS

The results were ascertained both by reviewing clinical records and by follow-up letter. Follow-up periods ranged from two weeks to more than nine years.

As with all pain-relieving operations, our means of estimating the results are purely subjective and rather personal. Only the patient can really judge the results in terms of whether the pain has ceased, decreased, or has been altered in any manner. We can judge in terms of duration or complete disappearance, but even then the judgments are not precise.

Nonneoplastic disease

Chronic relapsing pancreatitis. Nine patients underwent splanchnicectomy for abdominal pain due to chronic relapsing pancreatitis (*Table 2*). All patients had undergone prior surgical procedures on the pancreas; one patient had undergone 13 operations for pancreatic resection and drainage of pseudocysts. Five of the nine patients had diabetes mellitus, severe in three of them after pancreatic resections.

Bilateral procedures were performed seven times; in two patients only right-sided denervation was performed. Seven of the patients preoperatively had splanchnic nerve blocks with good temporary relief of pain.

Of the nine patients, results were excellent in seven; in the other two patients they were failures. The seven patients had good relief of the prior pain, and required no postoperative analgesics. In three patients severe postoperative intercostal neuropathy developed; one patient was relieved of this pain by repeated stellate blocks.

Although preoperatively all patients were taking large doses of narcotics, only three patients were considered to be addicted. The two failures in this group were in those of two patients who had been dependent on drugs for long periods. One 39-year-old woman began to take narcotics regularly eight weeks after the operation, at which time there was no clinical or laboratory evidence of recurrent pancreatitis. She continued to lose weight, on her own initiative took large doses of narcotics, and six months later committed suicide.

The other failure concerned a 36-year-old man who was free of pain for eight months after undergoing denervation. He then began to take narcotics regularly. Fifteen months postoperatively he was readmitted to the hospital and underwent an intensive investigation, including celiac angiography, which showed no evidence of pancreatic abnormality. Epidural anesthesia with a good sensory level gave him no relief of pain. He was discharged from the hospital with the recommendation that he make arrangements to be treated for drug addiction.

Biliary dyskinesia. Four patients underwent the procedure for pain due to biliary dyskinesia or postcholecystectomy syndrome (*Table 2*). The results of splanchnicectomy in this group of patients, who were followed for from six months to five and one-half years, were considered good. All patients were pleased with the relief from pain except one patient who at six months still suffered intercostal incisional pain that necessitated his taking moderate doses of a narcotic. He is known to be drug-dependent.

Disease not determined. Three patients underwent the procedure for relief of abdominal pain of undetermined origin (*Table 2*). These were all fairly young persons, all of whom had undergone some previous abdominal procedure. One patient had undergone 10 operations in an attempt to locate

the cause and to relieve the incapacitating pain. Two of the three patients, each after a unilateral splanchnicectomy, are completely free of pain 15 months and four and one-half years after operation. The third patient had complete relief of pain for seven months, after which, on four occasions partial intestinal obstruction developed with severe abdominal cramps that required hospitalization and narcotics. At the time of the last progress report, approximately one year after operation, she was receiving psychiatric help for narcotic addiction.

The last patient in this series underwent bilateral splanchnicectomy in 1950 for pain secondary to an abdominal aortic aneurysm that could not be safely resected. He gained so-called 50 percent relief of pain but died within two months of myocardial infarction.

Neoplastic disease

Carcinoma of pancreas. Splanchnicectomy for abdominal or back pain secondary to carcinoma of the pancreas was performed in 15 patients (*Table 2*). The operation in each case was bilateral and performed as a one-stage procedure. From 1963 to 1965, six of the patients underwent the denervating procedure after abdominal exploration and tumor biopsy performed during the same periods of anesthesia.

Three patients died during the first two weeks postoperatively, all from neoplastic disease; however, they had complete relief of pain during their brief survival.

Seven patients in the group survived for from 5 to 10 weeks after operation, with an average survival time of seven weeks. Six of the seven patients had complete relief of pain and required no analgesics. The seventh patient, who lived 10 weeks, experienced return of pain that required analgesics two weeks before her death.

Four patients survived for from four to six months postoperatively, three of whom had complete relief of pain except for the terminal two or three weeks of life. The fourth patient was a man who had complete relief of disabling pain in the back until his death five and one-half months postoperatively. However, abdominal pain returned three and one-half months before his death, and was associated with numerous bouts of partial intestinal obstruction, with vomiting, abdominal cramping, diarrhea, and loss of weight.

In one patient, who survived 14 months, splanchnicectomy was inadequate because of extensive involvement of the nerve fibers and retropleural space by tumor. He had no relief of pain.

Carcinoma of stomach. Three patients underwent the procedure for intractable pain secondary to carcinoma of the stomach (*Table 2*). Two of the patients, although completely relieved of upper abdominal discomfort, later experienced pain low in the abdomen or pelvis. This pain in all likelihood

Table 2.—*Results of splanchnicectomy for abdominal pain in 39 patients*

Cause of abdominal pain (total no. of patients)	Age of patient, years (sex)	Operations before splanchnicectomy	Nerve blocks (results)	Splanchnicectomy, type	Postoperative results	Comments
Nonneoplastic disease						
Chronic relapsing pancreatitis (9)						
Chronic relapsing pancreatitis; diabetes mellitus, pancreatic lithiasis	54 (M)	Subtotal pancreatectomy; splenectomy	Bilateral (complete)	Bilateral	Complete relief but postoperative intercostal neuropathy	Hypoglycemic coma with anoxia; severe diabetes mellitus with difficult management; died 4 weeks postoperatively
Chronic relapsing pancreatitis; volvulus of small bowel with gangrene; diabetes mellitus; postoperative toxic psychosis	51 (M)	13 operations on pancreas	Right (complete)	Right only	Complete relief but severe incisional pain	Died 4 weeks postoperatively of unknown cause
Chronic relapsing pancreatitis; pancreatic pseudocyst	64 (M)	Cholecystectomy; exploratory, common bile duct; resection pseudocyst; choledochoduodenostomy; pancreatic biopsy	Bilateral (complete)	Bilateral	Complete relief	Died 3 months postoperatively of unknown cause
Chronic relapsing pancreatitis	42 (M)	Exact procedure not known	Bilateral (complete)	Bilateral	Complete relief but postoperative intercostal neuropathy	Died 3½ years postoperatively of carcinoma of esophagus and drug addiction

Chronic relapsing pancreatitis; diabetes mellitus	50 (M)	Multiple operations	Right (good)	Right only	Complete relief	Living 15 months postoperatively
Acute hemorrhagic pancreatitic necrosis	29 (F)	Exploratory laparotomy; cholecystostomy	Bilateral (complete)	Bilateral	Complete relief	Living 5½ years postoperatively; severe diabetes mellitus
Chronic relapsing pancreatitis; pancreatic cyst; diabetes mellitus	66 (F)	Marsupilization of pseudocyst	Bilateral (complate)	Bilateral	Complete relief	Living 9½ years postoperatively
Chronic relapsing pancreatitis	39 (F)	Subtotal pancreatic resection; pancreaticojejunostomy	Bilateral (complete)	Bilateral	Pain less severe at 8 weeks; was taking narcotic regularly	Died 6 months postoperatively; probable suicide, drug addiction
Chronic relapsing pancreatitis	36 (M)	Resection tail of pancreas	None	Bilateral	Good relief for 8 months; return of pain	Takes narcotics regularly (addiction); pain not relieved by epidural anesthesia
Biliary dyskinesia (4)						
Biliary dyskinesia	30 (F)	Exploration of common bile duct	Bilateral (complete)	Right only	Complete relief for 5 years	Living; recurrent episodes of cholangitis with fever and vomiting
Biliary dyskinesia	45 (M)	Cholecystectomy	Left (complete)	Left only	Complete relief for 6 months; severe intercostal pain	Living; 8-month follow-up, diabetes mellitus, narcotic addiction
Biliary dyskinesia	55 (M)	5 operations	None	Bilateral	Complete relief for 5½ years	Living; had preoperative pain of 23 years' duration
Biliary dyskinesia	56 (M)	Exploratory laparotomy	Right (complete)	Bilateral, 4-month interval	Complete relief for 6 weeks, then left-sided pain; complete relief for 8 weeks after right-sided operation	Living; had preoperative pain of 4 years' duration

Table 2.—*Continued*

Cause of abdominal pain (total no. of patients)	Age of patient, years (sex)	Operations before splanchnicectomy	Nerve blocks (results)	Splanch-nicectomy, type	Postoperative results	Comments
Abdominal pain of undetermined origin (3)						
Right upper quadrant and lower thorax	42 (F)	Abdominal exploration	Right (complete relief)	Right only	Complete relief for 15 months	Living
Left lower quadrant pain	45 (M)	Several explorations	Bilateral (no relief)	Left only	Complete relief for 4½ years	Living, working full time
Left upper quadrant pain; postgastrectomy syndrome; narcotic addiction	45 (F)	10 operations	Bilateral (complete relief)	Bilateral	Complete relief for 7 months; 4 episodes partial intestinal obstruction requiring hospitalization; psychiatric care—drug addiction	Living
Abdominal aortic aneurysm	50 (M)	Abdominal exploration	None	Bilateral	"50%" pain relief; died 2 months postoperatively	Death from myocardial infarct
Neoplastic disease						
Carcinoma of pancreas (15)	*Classified according to survival times*					
3 patients		2 weeks			Complete relief for 2 weeks	Pneumonia, icterus, ascites, coma, hypoglycemia, anoxia; died 2 weeks postoperatively
6 patients		5–10 weeks			Complete relief for 5 to 10 weeks until death	
1 patient		5–10 weeks			Complete relief 8 weeks	Required analgesics 2 weeks terminally

4 patients		4–6 months			Complete but temporary relief for 4 to 6 months	Required analgesics 2 to 3 weeks terminally; 3 patients complete but intermittent abdominal cramps associated with partial intestinal obstruction last 8 weeks of life
1 patient		14 months			No relief	Inadequate splanchnicectomy due to extensive involvement of nerve fibers with tumor; died 14 months postoperatively
Other abdominal malignancies						
Carcinoma of stomach	49 (M)	Palliative resection with feeding jejunostomy	None	Bilateral	Complete relief for 9 months, then lower abdominal pain	Died 11 months postoperatively
Carcinoma of stomach	64 (M)	Abdominal exploration	None	Bilateral	Complete relief for 3 months, then lower abdominal pain, postsympathectomy neuropathy	Died 13 months postoperatively
Carcinoma of stomach with metastasis	65 (M)	Subtotal gastric resection	None	Bilateral	Complete relief until death; belt paresthesias about chest	Died 4 months postoperatively
Carcinoma of lung, left upper quadrant and left chest pain	62 (M)	Lung biopsy	Bilateral (good)	Bilateral	Complete relief of abdominal pain until death; chest pain persisted	Died 4 months postoperatively
Hepatoma with widespread metastasis	65 (M)	Partial hepatectomy	Left (complete)	Left only with abdominal exploration	Complete relief for 4 months, then right upper quadrant pain; no narcotics	Died 7 months postoperatively

Table 2.—*Concluded*

Cause of abdominal pain (total no. of patients)	Age of patient, years (sex)	Operations before Splanchnicectomy	Nerve blocks (results)	Splanch-nicectomy, type	Postoperative results	Comments
Other abdominal malignancies—concluded						
Reticulum cell sarcoma	49 (M)	Retroperitoneal biopsy	Bilateral (good)	Bilateral	Complete relief until death; anaplastic carcinoma in right ganglionic chain	Died 5 months postoperatively
Teratoma of abdomen	14 (M)	Several abdominal operations	Bilateral (poor)	Bilateral, 9-day interval	Complete relief; many bouts of partial intestinal obstruction with crampy pain and vomiting	Living 8½ months postoperatively

was due to pelvic parietal peritoneal implantations that commonly occur from carcinoma of the stomach.

Carcinoma of lung. One splanchnicectomy was performed for what at autopsy was diagnosed as bronchogenic carcinoma. The patient preoperatively had severe pain in the left upper quadrant of the abdomen and in the left lower part of the chest. Results of a lung biopsy were normal; splanchnic nerve blocks on two occasions gave good relief. After the splanchnicectomy the patient had complete relief of the abdominal component of the pain until his death four months later. The chest pain though not relieved was less severe than that preoperatively.

Hepatoma. A 65-year old man had severe disabling pain in the left upper quadrant and left flank. Two years previously he underwent a right lobe hepatectomy for a hepatoma. A left splanchnic nerve block gave him complete relief of pain. At abdominal reexploration extensive intraabdominal metastases were found. Under the same period of anesthesia the left splanchnic nerves and sympathetic nerve trunk were excised, which gave him complete relief of pain until his death seven months later. However, three months before his death, pain in the right upper quadrant developed. Perhaps a bilateral procedure would have prevented this terminal pain on the opposite side.

Reticulum cell sarcoma. A retroperitoneal biopsy showed the presence of reticulum cell sarcoma in one patient in whom severe upper abdominal pain was not relieved by morphine sulfate given in quarter-grain doses every three to four hours. Preoperatively a splanchnic nerve block gave him incomplete relief of pain. After a bilateral splanchnicectomy he was completely free of pain for the remaining five months of life. The pathologic report of the specimen showed anaplastic neoplasm in the right ganglionic chain.

Teratoma. The last patient in the neoplastic group was a 14-year old boy with an abdominal teratoma. He had previously undergone several abdominal operations, and had severe recurrent upper abdominal pain. A staged bilateral splanchnicectomy with a nine-day interval was performed to relieve the pain. He had complete relief of the abdominal pain experienced preoperatively, but has been admitted to the hospital many times because of acute intestinal obstructions associated with vomiting and crampy abdominal pains. These disorders have not required surgical treatment in the nine-month follow-up period.

DISCUSSION

Pain impulses arising within the abdominal cavity may reach the central nervous system by one of, or a combination of, three channels: (1) the sympathetic nerves, (2) the parasympathetic nerves, and (3) the somatic nerves innervating the body wall and the diaphragm. The terminology concerning

the autonomic nervous system is often quite confusing. Too frequently the term *sympathetic nervous system* is used inaccurately to designate the whole autonomic nervous system when it should properly be applied to only the anatomic thoracolumbar outflow.

Traditionally, neuroanatomists have defined the autonomic nervous system as an efferent system that supplies the heart, the glands and the smooth musculature with efferent innervation. At the same time, afferent sensory fibers from the viscera are described which are carried by the sympathetic nerves and white rami. These visceral nerve fibers that transmit pain should not be thought of as belonging to the autonomic system. Visceral innervation is mediated by mixed nerves with distinct sympathetic or parasympathetic efferent motor and visceral afferent sensory components.[2]

The viscerosensory nerve fibers, both myelinated and unmyelinated, running in the autonomic trunks, pass through the ganglia without synapses to reach their cells in the posterior root ganglia. According to White and Sweet[2] these fibers reach the spinal cord over both white and gray rami. On reaching the posterior horn of the spinal cord, painful impulses cross to the opposite side to the anterolateral column and ascend to the thalamus with the somatic afferent pathways. The sectioning of the spinothalamic tracts is well known to relieve visceral pain.

The greater splanchnic nerve is made up of rami leaving the fifth through the ninth ganglia of the thoracic paravertebral chain. The nerve descends on the lower thoracic vertebrae and there penetrates the crus of the diaphragm and ends in the celiac or semilunar ganglion around the origin of the celiac axis from the aorta. The celiac or solar plexus is the central distributing center for both the splanchnic nerves and the vagi. The plexus constitutes a dense network of nerve fibers around the aorta at the origin of the celiac axis and the renal and the superior mesenteric arteries. The lesser splanchnic nerve originates from the tenth and eleventh thoracic ganglia and penetrates the diaphragm with the major trunk. It enters the adrenocortical ganglion and is concerned largely with innervating the adrenal gland. The least splanchnic nerve originates from the twelfth thoracic paravertebral ganglion and ends in the renal plexus.

The nerves that enter the pancreas from the celiac plexus contain sympathetic, parasympathetic, and afferent components. The acinar and islet cells of the pancreas are innervated directly only through the parasympathetic nerves from the celiac plexus; the sympathetic components are distributed solely to the blood vessels.[3] The secretory responses to splanchnic stimulation apparently are due to vasomotor changes.

The sensory fibers of the biliary ducts and gallbladder are concentrated primarily in the right splanchnic nerve.[4] In cats, painful distension of the

gallbladder can be relieved by sectioning the right splanchnic nerve. That visceral afferent impulses travel alone by way of the right splanchnic nerve is indicated by persistence of pain after successive sectioning of the phrenic nerve, the intercostal nerves, the brachial plexus, the cervical sympathetic nerve trunk, the vagus nerves, and removal of the stellate ganglion.

Grimson, Hesser, and Kitchin[5] reported that they stimulated the proximal end of the divided left splanchnic nerve in a patient as the spinal anesthesia diminished, and he experienced a sensation of intense abdominal pain. Ray and Neill[6] reported that six patients who had undergone sympathectomy and splanchnicectomy to control hypertension, subsequently underwent abdominal operations under local anesthesia. In none of the patients could pain be elicited by applying pressure against the pancreas.

Mallet-Guy and De Beaujeu[7] performed a unilateral splanchnicectomy in 1942 in an operation on the biliary tract. In 1950 they reported 70 patients on whom they performed splanchnicectomies for chronic relapsing pancreatitis. These were performed, not for relief of pain, but for the beneficial effect of denervation upon the pancreatic process. They interpreted the clinical improvement obtained as the effect of the vasomotor changes, which, they believed, depressed the development of inflammatory sclerosis or interrupted the various reflex cycles responsible for acute or subacute recurrences. According to the six-year follow-up study of 37 of the 70 patients, favorable results occurred in 31 patients or 83.3 percent. The criteria used to judge improvement, together with relief of pain, were an increase in weight, a decrease in diarrhea, and the disappearance of functional symptoms. Francillon[8] discusses in detail one patient who had complete relief of pain three years after splanchnicectomy, during which time roentgenograms repeatedly showed diminution and disappearance of preoperative large calcific concretions in the pancreas.

Recently White and associates[9] reported from France a series of 146 left splanchnicectomies and celiac gangliectomies performed to relieve chronic and acute pancreatitis. Five-year follow-up studies of 116 patients showed no recurrence of the disease, and persistently good results in 85.7 percent of the patients. They stressed the importance of careful biliary and pancreatic investigation before performing denervation. De Takats, Walter, and Lasner[10] mention that internal biliary drainage may be necessary before undertaking denervation, since it relieves pain and abolishes visceral reflexes; it may also favor an increase in biliary reflux.

As in other reported similar series, the four patients on whom we performed splanchnicectomy for postcholecystectomy pain all had excellent relief. The mechanism of this pain is not understood. Womack and Crider[11] postulate that the pain may be associated with neuromas, which they have

observed about the common bile duct after cholecystectomy. They believe that from 5 to 20 percent of patients will have this persistent pain after undergoing cholecystectomy for symptoms typical of cholecystitis.

Pain control becomes the most important aspect of cancer therapy in many cases. White[12] stated that uncontrolled pain is really the basic justification for surgical treatment despite the short life expectancy of the patient. Acting on this philosophy, one can expect a high operative mortality and morbidity. In Belmusto and Owens' [13] series of patients chosen for cordotomy for relief of pain due to cancer, in which the patients were selected who could be expected to survive for a reasonable period postoperatively, the mortality rate was 19 percent the first 30 days. In that series of 56 cordotomies performed when a reasonable survival period could be expected, 31 patients were dead at six months, and 14 more within the first postoperative year.

The indications for splanchnicectomy to relieve pain due to cancer are, then, somewhat controversial. In some instances, by the time it produces pain the invasive process has extended beyond the visceral capsule into tissues innervated by the intercostal or lumbodorsal nerves, and thus relief of pain will be temporary. White[12] stated that sympathectomy is useless in all forms of carcinoma in which malignant cells have invaded retroperitoneal structures innervated by spinal nerves. The effect of a proposed denervation on the visceral pain can be tested preoperatively by a preliminary injection of procaine hydrochloride into the paravertebral ganglion and splanchnic nerve trunks.[14]

We believe that the pain should be relieved before the victim of the disease falls prey to the addiction of opiates. Three of the patients we treated, who received temporary relief from splanchnicectomy only to return to the use of opiates, were all well addicted before operation. In all three patients the procedure was performed for nonneoplastic disease. Similar patients should be treated vigorously for their addiction, and administration of narcotics should be withdrawn as soon as possible postoperatively. Chlorpromazine in large doses has been helpful during the withdrawal period.

The complications encountered were minimal in our series of patients. There was one wound infection; in five patients pneumothorax developed, one of whom required chest tube drainage. Severe postoperative incisional pain that persisted for as long as six weeks developed in four patients; and severe intercostal neuropathy sometimes lasting for many months developed in four patients. Perhaps this discomfort could have been avoided by sectioning the intercostal nerves, which at times are put under severe tension at the time of surgical exposure. The operation has not resulted in significant postural changes in blood pressure.

Concern was expressed, in early reports, about destroying the warning

signal of impending upper acute abdominal surgical emergencies by sectioning the splanchnic nerves.[15, 16] We have had no such difficulty with these patients, and those surgeons who have follow-up information on large series of sympathectomies have not noted serious consequences in patients who underwent upper abdominal denervation. The sensory fibers innervating the peritoneum are still intact and give warning of peritoneal irritation. Also, nausea, being mediated through the vagus nerves, is still able to warn of impending danger.

Craig, Morlock, and Hightower[17] in 1950 reviewed 963 cases of sympathetic ganglionectomy and splanchnic nerve resection performed for severe hypertension to determine the incidence of gastrointestinal complications. Of this series, 22 patients had organic disease of the gastrointestinal tract; 20 had duodenal ulcers, one patient a gastrojejunal ulcer, and another had chronic ulcerative colitis, all proved radiographically. Symptoms of duodenal ulcer occurred for the first time after denervation in seven patients or 0.74 percent of 963 patients. Of the 20 patients with duodenal ulcer, before or after denervation, the symptoms were entirely characteristic of the disease in 17 patients. The authors[17] concluded from their study that sympathetic and splanchnic denervation neither exposes a patient with known gastrointestinal disease to an increased hazard of complications, nor predisposes to the development of gastrointestinal disease.

Relatively little has been published in American literature in the last 15 years concerning splanchnic denervation for the control of abdominal pain. Before this time, there were many reports here as well as from France. The French surgeons have continued to use the procedure; a recent review evaluates 167 cases of splanchnicectomy performed in France for chronic relapsing pancreatitis.[9] The loss of interest in our country is in part due to the popularization of anterolateral cordotomy for the relief of pain. We believe that it may be best to proceed with the more benign conservative procedure, reserving the more radical bilateral cordotomy, with its attendant morbidity, for the occasional failure after splanchnicectomy to relieve pain.

SUMMARY AND CONCLUSION

Thirty-nine patients underwent splanchnicectomy for the relief of severe abdominal pain caused by incurable disease.

1. Seven of nine patients had excellent pain relief for periods of one month to more than nine years after splanchnicectomy for chronic relapsing pancreatitis. The two failures were in patients both of whom were addicted to opiates.

2. Four patients had excellent relief of pain when denervation was performed for biliary dyskinesia.

3. Of three patients who underwent splanchnicectomy for abdominal pain of undetermined origin, two had excellent relief and are employed full time; the third is currently under treatment for narcotic addiction.

4. Fifteen bilateral splanchnicectomies were performed for pain associated with carcinoma of the pancreas. In general the pain relief was excellent and complete up to 10 weeks postoperatively. Patients who survived longer generally required narcotics terminally.

5. Seven splanchnicectomies were performed for abdominal malignant disease not of pancreatic origin. Those patients who underwent the procedure for pain secondary to carcinoma of the stomach had good relief of their original upper abdominal pain, but experienced lower abdominal or pelvic pain as the disease progressed. In general, the relief of pain which ensued after abdominal denervation for other abdominal malignancies was encouraging.

CONCLUSION

We believe that this study shows a definite therapeutic value of splanchnic and sympathetic denervation of the upper abdominal viscera of patients who have pain associated with nonneoplastic disease for which there is no known medical or surgical cure. Splanchnicectomy, with its minimal risks, is also worth performing for the relief of pain secondary to neoplastic abdominal disease.

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