

A portrait of a man with a beard and brown hair, wearing a teal scrub top. He is smiling slightly. In the background, there is a framed diploma on the left and a diagram of a heart on the right. The diploma is from the University of Campania and mentions 'ARIA ELIA' and 'CHIPVIRGO'. The heart diagram is a detailed anatomical drawing of a heart with its major vessels.

Contents

Semimonthly Volume 8 Number 17 September 6, 2020

REVIEW

- 3621** Autoimmunity as the comet tail of COVID-19 pandemic
Talotta R, Robertson E
- 3645** Gender medicine: Lessons from COVID-19 and other medical conditions for designing health policy
Machluf Y, Chaïter Y, Tal O

MINIREVIEWS

- 3669** Complexities of diagnosis and management of COVID-19 in autoimmune diseases: Potential benefits and detriments of immunosuppression
Georgiev T, Angelov AK

ORIGINAL ARTICLE

Retrospective Study

- 3679** Incidental anal ¹⁸fluorodeoxyglucose uptake: Should we further examine the patient?
Moussaddaq AS, Brochard C, Palard-Novello X, Garin E, Wallenhorst T, Le Balc'h E, Merlini L'heritier A, Grainville T, Siproudhis L, Lièvre A
- 3691** Emergency surgery in COVID-19 outbreak: Has anything changed? Single center experience
D'Urbano F, Fabbri N, Koleva Radica M, Rossin E, Carcoforo P
- 3697** Somatostatin receptor scintigraphy in the follow up of neuroendocrine neoplasms of appendix
Saponjski J, Macut D, Sobic-Saranovic D, Ognjanovic S, Bozic Antic I, Pavlovic D, Artiko V
- 3708** Efficacy of stool multiplex polymerase chain reaction assay in adult patients with acute infectious diarrhea
Ahn JS, Seo SI, Kim J, Kim T, Kang JG, Kim HS, Shin WG, Jang MK, Kim HY
- 3718** Comparison of gemcitabine plus nab-paclitaxel and FOLFIRINOX in metastatic pancreatic cancer
Han SY, Kim DU, Seol YM, Kim S, Lee NK, Hong SB, Seo HI
- 3730** Shear wave elastography may be sensitive and more precise than transient elastography in predicting significant fibrosis
Yao TT, Pan J, Qian JD, Cheng H, Wang Y, Wang GQ
- 3743** Radioactive ¹²⁵I seed implantation for locally advanced pancreatic cancer: A retrospective analysis of 50 cases
Li CG, Zhou ZP, Jia YZ, Tan XL, Song YY
- 3751** Active surveillance in metastatic pancreatic neuroendocrine tumors: A 20-year single-institutional experience
Gao HL, Wang WQ, Xu HX, Wu CT, Li H, Ni QX, Yu XJ, Liu L

- 3763** Clinical efficacy of tocilizumab treatment in severe and critical COVID-19 patients

Zeng J, Xie MH, Yang J, Chao SW, Xu EL

- 3774** Phosphatidylinositol-3,4,5-trisphosphate dependent Rac exchange factor 1 is a diagnostic and prognostic biomarker for hepatocellular carcinoma

Cai Y, Zheng Q, Yao DJ

Observational Study

- 3786** Awareness and attitude of fecal microbiota transplantation through transendoscopic enteral tubing among inflammatory bowel disease patients

Zhong M, Sun Y, Wang HG, Marcella C, Cui BT, Miao YL, Zhang FM

CASE REPORT

- 3797** Cauda equina arachnoiditis – a rare manifestation of West Nile virus neuroinvasive disease: A case report

Santini M, Zupetic I, Viskovic K, Krznaric J, Kutlesa M, Krajcinovic V, Polak VL, Savic V, Tabain I, Barbic L, Bogdanic M, Stevanovic V, Mrzljak A, Vilibic-Cavlek T

REVIEW

- 3804** Portal gas in neonates; is it always surgical? A case report

Altokhais TI

CASE REPORT

- 3808** Large lingual heterotopic gastrointestinal cyst in a newborn: A case report

Lee AD, Harada K, Tanaka S, Yokota Y, Mima T, Enomoto A, Kogo M

- 3814** Osteochondral lesion of talus with gout tophi deposition: A case report

Kim T, Choi YR

- 3821** Traumatic neuroma of remnant cystic duct mimicking duodenal subepithelial tumor: A case report

Kim DH, Park JH, Cho JK, Yang JW, Kim TH, Jeong SH, Kim YH, Lee YJ, Hong SC, Jung EJ, Ju YT, Jeong CY, Kim JY

- 3828** Autoimmune hepatitis in a patient with immunoglobulin A nephropathy: A case report

Jeon YH, Kim DW, Lee SJ, Park YJ, Kim HJ, Han M, Kim IY, Lee DW, Song SH, Lee SB, Seong EY

- 3835** Diagnosis of an actively bleeding brachial artery hematoma by contrast-enhanced ultrasound: A case report

Ma JJ, Zhang B

- 3841** Lung adenocarcinoma harboring rare epidermal growth factor receptor L858R and V834L mutations treated with icotinib: A case report

Zhai SS, Yu H, Gu TT, Li YX, Lei Y, Zhang HY, Zhen TH, Gao YG

- 3847** Gastroduodenitis associated with ulcerative colitis: A case report

Yang Y, Li CQ, Chen WJ, Ma ZH, Liu G

- 3853** Majocchi's granuloma caused by *Trichophyton rubrum* after facial injection with hyaluronic acid: A case report
Liu J, Xin WQ, Liu LT, Chen CF, Wu L, Hu XP
- 3859** Novel deletion mutation in Bruton's tyrosine kinase results in X-linked agammaglobulinemia: A case report
Hu XM, Yuan K, Chen H, Chen C, Fang YL, Zhu JF, Liang L, Wang CL
- 3867** Multidisciplinary treatment of life-threatening hemoptysis and paraplegia of choriocarcinoma with pulmonary, hepatic and spinal metastases: A case report
Lin YY, Sun Y, Jiang Y, Song BZ, Ke LJ
- 3875** Diagnostic value of ultrasound in the spontaneous rupture of renal angiomyolipoma during pregnancy: A case report
Zhang T, Xue S, Wang ZM, Duan XM, Wang DX
- 3881** Gallbladder sarcomatoid carcinoma: Seven case reports
Qin Q, Liu M, Wang X
- 3890** Surgical strategy used in multilevel cervical disc replacement and cervical hybrid surgery: Four case reports
Wang XF, Meng Y, Liu H, Hong Y, Wang BY
- 3903** Diagnosis and treatment of an elderly patient with 2019-nCoV pneumonia and acute exacerbation of chronic obstructive pulmonary disease in Gansu Province: A case report
He TP, Wang DL, Zhao J, Jiang XY, He J, Feng JK, Yuan Y
- 3911** Diagnosis and treatment of mixed infection of hepatic cystic and alveolar *echinococcosis*: Four case reports
A JD, Chai JP, Wang H, Gao W, Peng Z, Zhao SY, A XR

ABOUT COVER

Editorial board member of World Journal of Clinical Cases, Dr. Elia de Maria is Adjunct Professor of Arrhythmology Lab in the Cardiology Unit, Ramazzini Hospital in Carpi, Italy. He graduated in Medicine and Surgery from the University of Napoli in 1999, continuing on to obtain specialization in Cardiology in 2003. He also holds the distinction of High Degree Master in Electrophysiology and Cardiac Stimulation. Since 2005, he has practiced as a Permanent Consultant Cardiologist in the Italian Public Hospitals, and since 2015 as an External Contract Professor in the Faculty of Medicine and Surgery of University of Verona. His clinical and research interests encompass pharmacological therapy in acute and chronic cardiac conditions, temporary and definitive pacing, thoracentesis and pericardiocentesis, and hemodynamic monitoring. (L-Editor: Filipodia)

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The WJCC is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, PubMed, and PubMed Central. The 2020 Edition of Journal Citation Reports® cites the 2019 impact factor (IF) for WJCC as 1.013; IF without journal self cites: 0.991; Ranking: 120 among 165 journals in medicine, general and internal; and Quartile category: Q3.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Yan-Xia Xing; Production Department Director: Yun-Xiaojuan Wu; Editorial Office Director: Jin-Lai Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Semimonthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Sandro Vento, Bao-Gan Peng

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

September 6, 2020

COPYRIGHT

© 2020 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Retrospective Study

Radioactive ^{125}I seed implantation for locally advanced pancreatic cancer: A retrospective analysis of 50 cases

Cheng-Gang Li, Zhi-Peng Zhou, Yu-Ze Jia, Xiang-Long Tan, Yu-Yao Song

ORCID number: Cheng-Gang Li 0000-0001-7990-1300; Zhi-Peng Zhou 0000-0001-8881-1972; Yu-Ze Jia 0000-0003-2473-7907; Xiang-Long Tan 0000-0003-2185-2416; Yu-Yao Song 0000-0002-9048-0591.

Author contributions: Li CG and Zhou ZP contributed equally to this work and should be considered as co-first authors; Li CG and Zhou ZP analyzed and interpreted the data and wrote the article; Tan XL, Jia YZ, and Song YY drafted the work and collected the data; Li CG designed the study and revised the manuscript for important intellectual content.

Institutional review board

statement: This study was reviewed and approved by the Ethics Committee of the Chinese PLA General Hospital (S2016-098-02).

Informed consent statement:

Patients were not required to give informed consent to the study because the analysis used anonymous clinical data that were obtained after each patient agreed to treatment by written consent.

Conflict-of-interest statement: All

authors declare no conflicts of interest related to this article.

Data sharing statement: No

Cheng-Gang Li, Zhi-Peng Zhou, Yu-Ze Jia, Xiang-Long Tan, Yu-Yao Song, Second Department of Hepatobiliary Surgery, Chinese PLA General Hospital, Beijing 100853, China

Corresponding author: Cheng-Gang Li, MD, PhD, Associate Professor, Second Department of Hepatobiliary Surgery, Chinese PLA General Hospital, No. 28 Fuxing Road, Beijing 100853, China. lccgang301@126.com

Abstract

BACKGROUND

Pancreatic cancer is one of the common malignant tumors of the digestive system, and radical resection is the first choice of treatment for pancreatic cancer. If patients with locally advanced pancreatic cancer cannot be treated in time and effectively, their disease often develops rapidly and their survival period is very short.

AIM

To evaluate the therapeutic effect of ^{125}I seed implantation in patients with locally advanced pancreatic cancer.

METHODS

The demographics and perioperative outcomes of a consecutive series of patients who underwent ^{125}I seed implantation to treat locally advanced pancreatic cancer between January 1, 2017 and June 30, 2019 were retrospectively analyzed. According to the results of preoperative computed tomography or magnetic resonance imaging, the treatment planning system was used to determine the area and number of ^{125}I seeds implanted. During the operation, ^{125}I seeds were implanted into the tumor under the guidance of intraoperative ultrasound, with a spacing of 1.5 cm and a row spacing of 1.5 cm. For patients with obstructive jaundice and digestive tract obstruction, choledochojejunostomy and gastroenterostomy were performed simultaneously. After operation, the patients were divided into a non-chemotherapy group and a chemotherapy group that received gemcitabine combined with albumin-bound paclitaxel treatment.

RESULTS

Among the 50 patients, there were 29 males and 21 females, with a mean age of 56.9 ± 9.8 years. The main reason for the failure of radical resection was superior mesenteric artery invasion (37, 74%), followed by superior mesenteric vein invasion (33, 66%). Twenty-one (62%) patients underwent palliative surgery and

additional data are available.

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Manuscript source: Unsolicited manuscript

Received: April 14, 2020

Peer-review started: April 14, 2020

First decision: May 15, 2020

Revised: May 25, 2020

Accepted: August 12, 2020

Article in press: August 12, 2020

Published online: September 6, 2020

P-Reviewer: Grigione N, Theiss AL

S-Editor: Wang JL

L-Editor: Wang TQ

P-Editor: Liu JH



postoperative pain relief occurred in 40 (80%) patients. The estimated blood loss in operation was 107.4 ± 115.3 mL and none of the patient received blood transfusion. The postoperative hospital stay was 7.5 ± 4.2 d; one patient had biliary fistula and three had pancreatic fistula, all of whom recovered after conservative treatment. After operation, 26 patients received chemotherapy and 24 did not. The 1-year survival rate was significantly higher in patients who received chemotherapy than in those who did not (60.7% *vs* 35.9%, $P = 0.034$). The mean overall survival of patients of the chemotherapy group and non-chemotherapy group was 14 and 11 mo, respectively ($\chi^2 = 3.970$, $P = 0.046$).

CONCLUSION

Radioactive ^{125}I seed implantation combined with postoperative chemotherapy can prolong the survival time, relieve pain, and improve the quality of life of patients with locally advanced pancreatic cancer.

Key words: Pancreatic cancer; Radioactive ^{125}I seeds; Radiotherapy; Permanent implantation

©The Author(s) 2020. Published by Baishideng Publishing Group Inc. All rights reserved.

Core tip: The survival period of patients with locally advanced pancreatic cancer is very short. Radioactive ^{125}I seed implantation can prolong the survival time, relieve pain, and improve the quality of life of patients with locally advanced pancreatic cancer.

Citation: Li CG, Zhou ZP, Jia YZ, Tan XL, Song YY. Radioactive ^{125}I seed implantation for locally advanced pancreatic cancer: A retrospective analysis of 50 cases. *World J Clin Cases* 2020; 8(17): 3743-3750

URL: <https://www.wjgnet.com/2307-8960/full/v8/i17/3743.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v8.i17.3743>

INTRODUCTION

Pancreatic cancer is one of the common malignant tumors of the digestive system, which has the characteristics of late detection, early metastasis, rapid progression, and poor prognosis. In recent decades, the incidence of pancreatic cancer has been increasing year by year in the world. Although the surgical resection rate has been improved, the overall prognosis and survival of patients have not improved significantly^[1-3]. Radical resection is the first choice of treatment for pancreatic cancer, which is considered to be the best choice to prolong the survival of patients. However, due to the atypical early symptoms of pancreatic cancer, most of the patients were diagnosed at an advanced stage. About 10%-30% of all pancreatic cancer patients could receive radical resection, and the 5-year survival rate was less than 10%^[4-6].

If patients with pancreatic cancer cannot undergo radical resection and be treated in time and effectively, their condition often deteriorates rapidly and their survival time is very short. The mean survival time of those patients is only 6-10 mo^[7]. Radioactive seed implantation is an alternative treatment for locally advanced pancreatic cancer. In 1965, radioactive ^{125}I seed came out. ^{125}I seeds were first used in the treatment of prostate cancer patients and achieved success^[8]. Up to now, ^{125}I seeds have been used as the first choice for the treatment of early prostate cancer in developed countries such as Europe and the United States. Its curative effect is equivalent to that of radical resection^[9,10].

In recent years, with the rapid development of computer technology, imaging, and radiation physics, radioactive seed implantation has been widely used. At the same time, the physical and biological characteristics of ^{125}I seeds have been studied intensely. In particular, the clinical efficacy and complications of ^{125}I seed implantation in the treatment of tumors have been considered and discussed, and a large amount of valuable experience has been accumulated. These results promoted the rapid development of ^{125}I seed implantation technology, and provided a new choice for the treatment of patients with locally advanced pancreatic cancer^[11-13]. The purpose of this study was to summarize a single center experience with ^{125}I seed implantation in the

treatment of locally advanced pancreatic cancer.

MATERIALS AND METHODS

Patients

The clinical data of 50 patients with locally advanced pancreatic cancer who underwent ^{125}I seed implantation between January 1, 2017 and June 30, 2019 were retrospectively analyzed. This study was approved by the Institutional Review Board of Chinese PLA General Hospital.

Selection of the patients

The inclusion criteria were: (1) Advanced pancreatic cancer confirmed by pathology; (2) No distant metastasis detected by preoperative imaging; and (3) Anastomosis was performed and ^{125}I seed were implanted in the tumor to relieve jaundice and obstruction of the digestive tract. The exclusion criteria were: (1) Karnofsky Performance Scale score < 70; (2) Systemic failure symptoms; and (3) Other medical conditions that contraindicated anesthesia and surgery.

Physical characteristics of ^{125}I seeds

The physical half-life of the radioactive ^{125}I seeds (China Isotope and Radiation Corporation, Beijing, China) used in this study is 59.6 d, the diameter is 0.8 mm, the length is 4.5 mm, and the wall thickness is 0.05 mm. The half value layer of the seeds for lead is 0.025 mm and it is 20.0 mm for soft tissue in human body. Activity range of a single seed is 11.1-37 MBq and it can radiate 27.4 and 31.4 keV X-ray and 35.5 keV γ -ray.

Preoperative evaluation

Magnetic resonance imaging (MRI) or contrast-enhanced computed tomography (CT) was performed as a routine diagnostic procedure. According to the results of preoperative CT or MRI, the treatment planning system (TPS) was used to determine the area and number of ^{125}I seeds implanted. During the operation, ^{125}I seeds were implanted into the tumor under the guidance of intraoperative ultrasound, with a spacing of 1.5 cm and a row spacing of 1.5 cm. The matched peripheral dose of ^{125}I seeds implanted in patients in this study was 110-160 Gy.

Perioperative data

The baseline demographics and perioperative and pathology data were obtained from the electronic medical records. The clinical outcomes, including estimated blood loss (EBL), postoperative complications, and postoperative hospital stay (PHS), were analyzed retrospectively. Postoperative biliary fistula was defined as the outflow of bile or bile containing fluid from the abdominal drainage tube. Postoperative pancreatic fistula was defined as pancreatic juice flowing out of the body through abdominal drainage tube or incision, and the amylase content in the drainage fluid is three times higher than that in blood.

Surgical technique and postoperative chemotherapy

During the operation, the resectability of the tumor was explored first. If the tumor invades the superior mesenteric vein or the superior artery or locally invades the retroperitoneum, the radical resection cannot be performed and frozen pathology was performed by puncture biopsy. ^{125}I seeds were implanted into the tumor under the guidance of intraoperative ultrasound after being confirmed by pathology as pancreatic cancer. For patients with obstructive jaundice or digestive tract obstruction, choledochojunostomy and gastroenterostomy were performed simultaneously. After operation, the patients were divided into a non-chemotherapy group and a chemotherapy group that received gemcitabine combined with albumin-bound paclitaxel treatment.

All patients were followed 1 mo after discharge and then at 3-mo intervals thereafter.

Statistical analysis

Continuous data are presented as the mean \pm SD or the median and interquartile range according to their distributions. The Student's *t*-test was used to compare normally distributed variables between groups, whereas the Mann-Whitney *U* test was used for

non-normally distributed variables. Overall survival (OS) was estimated using the Kaplan-Meier method, and comparison of OS between subgroups was analyzed using the log-rank test. A *P* value of < 0.05 was considered statistically significant. All analyses were performed with the IBM SPSS statistical software, version 22 (SPSS, Chicago, IL, United States).

RESULTS

Patient characteristics

Table 1 shows the detailed characteristics of the 50 patients. The patients included 29 men and 21 women with a mean age of 56.9 years. The most common tumor site was the pancreatic head (28, 56%), followed by the pancreatic neck and body (17, 34%) and pancreatic tail (5, 10%). The main reason for the failure of radical resection was superior mesenteric artery invasion (37, 74%), followed by excellent mesenteric vein invasion (33, 66%), and tumor invaded the artery and vein at the same time in half of all the patients. Twenty-one (62%) patients underwent palliative surgery and postoperative pain relief occurred in 40 (80%) patients. All the tumors were pancreatic adenocarcinoma on final histopathological examination.

Perioperative outcomes

All patients were successfully implanted with ^{125}I seeds; 15 patients underwent choledochojejunostomy, and six underwent choledochojejunostomy combined with gastroenterostomy. The EBL in operation was 107.4 ± 115.3 mL and none of the patient received blood transfusion. The PHS was 7.5 ± 4.2 d; one patient had biliary fistula and three had pancreatic fistula, all of whom recovered after conservative treatment. **Figure 1** shows that the ^{125}I seeds were evenly distributed in tumor as revealed by postoperative CT reexamination.

Postoperative survival analysis

As of the last follow-up, 11 patients were still alive and 39 died. After operation, 26 patients received chemotherapy and 24 did not. **Table 2** shows the baseline data of the two groups of patients, and there was no significant difference between the two groups in age, gender, tumor location, or operation mode. The 1-year survival rate was significantly higher in patients who received chemotherapy than in those who did not (60.7% *vs* 35.9%, *P* = 0.034). **Figure 2** shows that the mean OS of patients of the chemotherapy group and non-chemotherapy group was 14 and 11 mo, respectively ($\chi^2 = 3.970$, *P* = 0.046).

DISCUSSION

The pancreas is a typical retroperitoneal organ with a complex and special anatomic location that is deeply surrounded by gastrointestinal organs, the liver, the kidney, the spinal cord, and other organs. The biological behavior of pancreatic cancer is not sensitive to radiotherapy, and the radiation tolerance of surrounding tissues is low. Conventional external radiotherapy cannot accurately locate the lesion area so that the therapeutic dose of radiation reaches the non-target area or even the normal tissue area, causing severe damage to surrounding organs^[14-16].

Local adaptation and low-dose continuous therapy are the main and superior characteristics of ^{125}I seeds in the treatment of pancreatic cancer. ^{125}I seeds have beneficial biological characteristics and regulatory ability for the distribution ratio of the radiation dose between the treatment target and normal tissue. They are suitable for clinical application in implantable radiotherapy and are effective in the treatment of various malignant tumors^[17-19]. For locally advanced pancreatic cancer, the TPS combined with ultrasound guidance can ensure the reasonable space location of ^{125}I seeds and maximize their killing effect.

The invasion and growth of pancreatic cancer are mainly caused by continuous proliferation of tumor cells. The DNA of tumor cells in the proliferative period is in the late stage of synthesis and mitosis and is extremely sensitive to gamma rays. A small number of gamma rays can destroy DNA, preventing tumor cell proliferation^[20,21]. After implantation into tumor tissue, ^{125}I seeds can continuously release low-dose gamma rays to kill tumor cells, damage the DNA of tumor cells, inhibit tumor cell proliferation, and induce tumor cell apoptosis. At the same time, studies have shown

Table 1 Characteristics of patients with locally advanced pancreatic cancer (*n* = 50), *n* (%)

Clinicopathologic feature	Value
Mean age (range), yr	56.9 ± 9.8 (38-80)
Sex	
Male	29 (58)
Female	21 (42)
Tumor location	
Head	28 (56)
Neck and body	17 (34)
Tail	5 (10)
Vascular involvement	
Any superior mesenteric vein	33 (66)
Any superior mesenteric artery	37 (74)
Both venous and arterial	25 (50)
Palliative operation	21 (62)
Choledochojejunostomy	15 (71.4)
Choledochojejunostomy and gastroenterostomy	6 (28.6)
Postoperative pain relief	
Complete remission	10 (20)
Partial remission	30 (60)
No relief	10 (20)
Postoperative hospital stay, d	7.5 ± 4.2 (4-25)
Estimated blood loss, mL	107.4 ± 115.3 (10-600)
Postoperative complications	
Biliary fistula	1 (2)
Pancreatic fistula	3 (6)
Vital status at last follow-up	
Alive	11 (22)
Dead	39 (78)
Median overall survival (range), mo	12.0 (4-24)

that ¹²⁵I seeds can enhance the sensitivity of hypoxic cells in tumors and enhance their ability to kill tumor cells. Continuous irradiation in tumor tissue can significantly improve its biological effect and has the advantages of minor damage to surrounding normal tissues and a low incidence of adverse reactions^[22,23].

Our results showed that patients with locally advanced pancreatic cancer who received radioactive particle implantation had improved pain and quality of life. The combination of postoperative chemotherapy is helpful to prolong the survival period of patients. We recommend that all patients have a biopsy during or before surgery. If possible, gene detection should be carried out on the patient biopsy samples to choose a possible and effective scheme for further chemotherapy after surgery.

Complications of ¹²⁵I seed implantation in the treatment of pancreatic cancer can occur not only during implantation but also after implantation. Complications during surgery are rare, mainly due to direct damage caused by the puncture needle accidentally penetrating the surrounding blood vessels and tissues during the implantation of particles, leading to bleeding and pancreatic fistula at the puncture site. The needle channel should be carefully adjusted under ultrasound guidance to avoid puncture into the blood vessels and dilated pancreatic duct^[24,25]. Our experience is that a 4/0 Prolene suture should be used to suture the puncture point after removing the puncture needle after each particle implantation to reduce the incidence

Table 2 Baseline data of patients of the two groups ($n = 50$)

Clinicopathologic feature	Non-chemotherapy ($n = 24$)	Chemotherapy ($n = 26$)	<i>P</i> value
Mean age (range), yr	58.75 (38-80)	55.31 (38-69)	0.220
Sex			
Male	14	15	0.595
Female	10	11	
Tumor location			
Head	15	13	0.645
Neck and body	7	10	
Tail	2	3	
Palliative operation			
Choledochojejunostomy	10	5	1.000
Choledochojejunostomy and gastroenterostomy	4	2	
1-year survival rate (%)	35.9	60.7	0.034

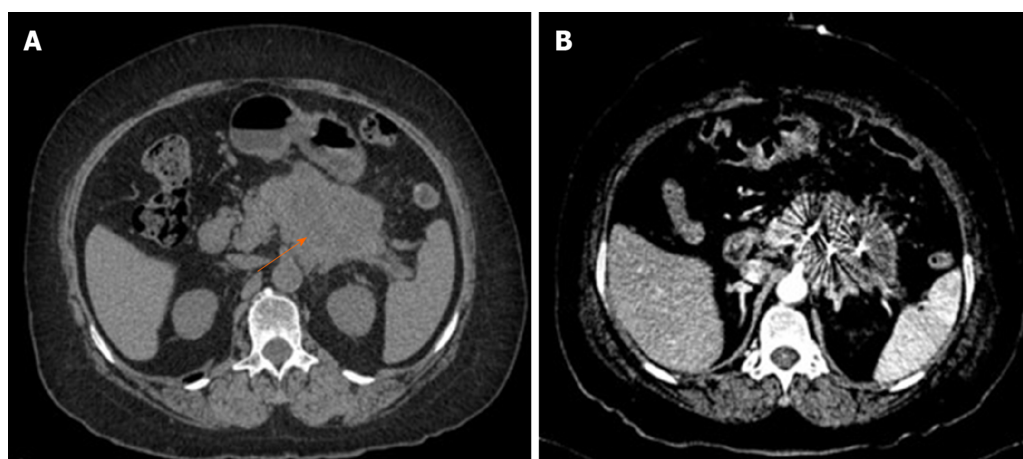


Figure 1 Radioactive ^{125}I seed implanted in locally advanced pancreatic cancer. A: Preoperative computed tomography (CT) showed locally advanced pancreatic cancer (arrow); B: Postoperative CT showed the radioactive ^{125}I seeds implanted in the tumor.

of bleeding and pancreatic leakage. Postoperative complications include seed displacement, local embolism, pain, liver dysfunction, and pancreatic fistula. The complications of radiation inflammation and bleeding and obstruction of the gastrointestinal tract reported in the literature have not occurred in this study.

In conclusion, our experience shows that ^{125}I seed implantation not only is effective for patients with unresectable local advanced pancreatic cancer but can also reduce the clinical symptoms and prolong the relative survival time of those patients.

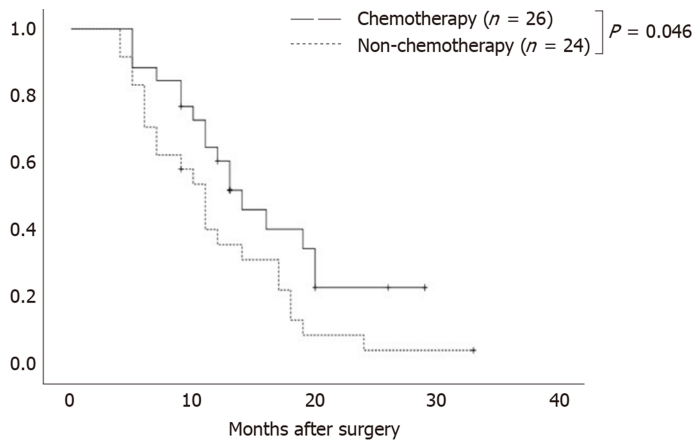


Figure 2 Kaplan-Meier cumulative survival curves according to the chemotherapy status. The median survival for 26 patients who received chemotherapy was 14 mo, which was significantly longer than that for 24 patients who did not receive chemotherapy (11 mo) ($P = 0.046$).

ARTICLE HIGHLIGHTS

Research background

Pancreatic cancer has the characteristics of late detection, early metastasis, rapid progression, and poor prognosis.

Research motivation

Application of ^{125}I seeds in the treatment of pancreatic cancer.

Research objectives

To summarize a single center experience with ^{125}I seed implantation in the treatment of locally advanced pancreatic cancer.

Research methods

The demographics and perioperative outcomes of a consecutive series of patients who underwent ^{125}I seed implantation to treat locally advanced pancreatic cancer were retrospectively analyzed. According to the results of preoperative computed tomography or magnetic resonance imaging, the treatment planning system was used to determine the area and number of ^{125}I seeds implanted.

Research results

Among the 50 patients, there were 29 males and 21 females, with a mean age of 56.9 ± 9.8 years. The main reason for the failure of radical resection was superior mesenteric artery invasion, followed by superior mesenteric vein invasion. Twenty-one patients underwent palliative surgery and postoperative pain relief occurred in 40 patients. The estimated blood loss in operation was 107.4 ± 115.3 mL and none of the patient received blood transfusion. After operation, 26 patients received chemotherapy and 24 patients did not. The 1-year survival rate was significantly higher in patients who received chemotherapy than in those who did not. The mean OS of patients of the chemotherapy group and non-chemotherapy group was 14 mo and 11 mo, respectively.

Research conclusions

Our experience shows that ^{125}I seed implantation is not only effective for unresectable local advanced pancreatic cancer patients, but can also reduce the clinical symptoms and prolong the relative survival time of those patients.

Research perspectives

The diversification of cancer treatments has contributed to its survival rate.

REFERENCES

- 1 **Rawla P**, Sunkara T, Gaduputi V. Epidemiology of Pancreatic Cancer: Global Trends, Etiology and Risk Factors. *World J Oncol* 2019; **10**: 10-27 [PMID: 30834048 DOI: 10.14740/wjon1166]
- 2 **Noel M**, Fiscella K. Disparities in Pancreatic Cancer Treatment and Outcomes. *Health Equity* 2019; **3**: 532-540 [PMID: 31663065 DOI: 10.1089/heq.2019.0057]
- 3 **Zhou B**, Wu D, Liu H, Du LT, Wang YS, Xu JW, Qiu FB, Hu SY, Zhan HX. Obesity and pancreatic cancer: An update of epidemiological evidence and molecular mechanisms. *Pancreatol* 2019; **19**: 941-950 [PMID: 31447281 DOI: 10.1016/j.pan.2019.08.008]
- 4 **Wegner RE**, Verma V, Hasan S, Schiffman S, Thakkar S, Horne ZD, Kulkarni A, Williams HK, Monga D, Finley G, Kirichenko AV. Incidence and risk factors for post-operative mortality, hospitalization, and readmission rates following pancreatic cancer resection. *J Gastrointest Oncol* 2019; **10**: 1080-1093 [PMID: 31949925 DOI: 10.21037/jgo.2019.09.01]
- 5 **Furukawa K**, Shiba H, Hamura R, Haruki K, Fujiwara Y, Usuba T, Nakabayashi Y, Misawa T, Okamoto T, Yanaga K. Prognostic Factors in Patients With Recurrent Pancreatic Cancer: A Multicenter Database Analysis. *Anticancer Res* 2020; **40**: 293-298 [PMID: 31892579 DOI: 10.21873/anticancer.13952]
- 6 **Shridhar R**, Takahashi C, Huston J, Meredith KL. Neoadjuvant therapy and pancreatic cancer: a national cancer database analysis. *J Gastrointest Oncol* 2019; **10**: 663-673 [PMID: 31392047 DOI: 10.21037/jgo.2019.02.09]
- 7 **Gai B**, Zhang F. Chinese expert consensus on radioactive ¹²⁵I seeds interstitial implantation brachytherapy for pancreatic cancer. *J Cancer Res Ther* 2018; **14**: 1455-1462 [PMID: 30589023 DOI: 10.4103/jcr.JCRT_96_18]
- 8 **Beyer DC**, Priestley JB Jr. Biochemical disease-free survival following ¹²⁵I prostate implantation. *Int J Radiat Oncol Biol Phys* 1997; **37**: 559-563 [PMID: 9112453 DOI: 10.1016/s0360-3016(96)00609-8]
- 9 **Ennis RD**, Hu L, Ryemon SN, Lin J, Mazumdar M. Brachytherapy-Based Radiotherapy and Radical Prostatectomy Are Associated With Similar Survival in High-Risk Localized Prostate Cancer. *J Clin Oncol* 2018; **36**: 1192-1198 [PMID: 29489433 DOI: 10.1200/JCO.2017.75.9134]
- 10 **Wallis CJD**, Saskin R, Choo R, Herschorn S, Kodama RT, Satkunavivam R, Shah PS, Danjoux C, Nam RK. Surgery Versus Radiotherapy for Clinically-localized Prostate Cancer: A Systematic Review and Meta-analysis. *Eur Urol* 2016; **70**: 21-30 [PMID: 26700655 DOI: 10.1016/j.eururo.2015.11.010]
- 11 **Xu W**, Liu Y, Lu Z, Jin ZD, Hu YH, Yu JG, Li ZS. A new endoscopic ultrasonography image processing method to evaluate the prognosis for pancreatic cancer treated with interstitial brachytherapy. *World J Gastroenterol* 2013; **19**: 6479-6484 [PMID: 24151368 DOI: 10.3748/wjg.v19.i38.6479]
- 12 **Huang ZM**, Pan CC, Wu PH, Zhao M, Li W, Huang ZL, Yi RY. Efficacy of minimally invasive therapies on unresectable pancreatic cancer. *Chin J Cancer* 2013; **32**: 334-341 [PMID: 22958741 DOI: 10.5732/cjc.012.10093]
- 13 **Du YQ**, Li ZS, Jin ZD. Endoscope-assisted brachytherapy for pancreatic cancer: From tumor killing to pain relief and drainage. *J Interv Gastroenterol* 2011; **1**: 23-27 [PMID: 21686109 DOI: 10.4161/jig.1.1.14596]
- 14 **Zhang ZK**, Yang YM. [Current research status and progress in comprehensive diagnosis and treatment of pancreatic cancer in the era of targeted therapy]. *Zhonghua Wai Ke Za Zhi* 2020; **58**: 22-26 [PMID: 31902165 DOI: 10.3760/cma.j.issn.0529-5815.2020.01.006]
- 15 **Fujinaga H**, Sakai Y, Yamashita T, Arai K, Terashima T, Komura T, Seki A, Kawaguchi K, Nasti A, Yoshida K, Wada T, Yamamoto K, Kume K, Hasegawa T, Takata T, Honda M, Kaneko S. Biological characteristics of gene expression features in pancreatic cancer cells induced by proton and X-ray irradiation. *Int J Radiat Biol* 2019; **95**: 571-579 [PMID: 30557072 DOI: 10.1080/09553002.2019.1558297]
- 16 **Li D**, Su D, Xue L, Liu Y, Pang W. Establishment of pancreatic cancer stem cells by flow cytometry and their biological characteristics. *Int J Clin Exp Pathol* 2015; **8**: 11218-11223 [PMID: 26617845]
- 17 **Kou F**, Gao S, Liu S, Wang X, Chen H, Zhu X, Guo J, Zhang X, Feng A, Liu B. Preliminary clinical efficacy of iodine-125 seed implantation for the treatment of advanced malignant lung tumors. *J Cancer Res Ther* 2019; **15**: 1567-1573 [PMID: 31939439 DOI: 10.4103/jcr.JCRT_581_19]
- 18 **Song Z**, Ye J, Wang Y, Li Y, Wang W. Computed tomography-guided iodine-125 brachytherapy for unresectable hepatocellular carcinoma. *J Cancer Res Ther* 2019; **15**: 1553-1560 [PMID: 31939437 DOI: 10.4103/jcr.JCRT_629_19]
- 19 **Liu SF**, Lu J, Wang H, Han Y, Wang DF, Yang LL, Li ZX, Hu XK. Computed tomography-magnetic resonance imaging fusion-guided iodine-125 seed implantation for single malignant brain tumor: Feasibility and safety. *J Cancer Res Ther* 2019; **15**: 818-824 [PMID: 31436237 DOI: 10.4103/jcr.JCRT_70_19]
- 20 **Ghaly M**, Gogineni E, Saif MW. The Evolving Field of Stereotactic Body Radiation Therapy in Pancreatic Cancer. *Pancreas (Fairfax)* 2019; **3**: 9-14 [PMID: 31930185 DOI: 10.17140/POJ-3-110]
- 21 **Nichols RC**, Rutenberg M. Optimizing neoadjuvant radiotherapy for resectable and borderline resectable pancreatic cancer using protons. *World J Gastrointest Surg* 2019; **11**: 303-307 [PMID: 31602289 DOI: 10.4240/wjgs.v11.i7.303]
- 22 **Palta M**, Godfrey D, Goodman KA, Hoffer S, Dawson LA, Dessert D, Hall WA, Herman JM, Khorana AA, Merchant N, Parekh A, Patton C, Pepek JM, Salama JK, Tuli R, Koong AC. Radiation Therapy for Pancreatic Cancer: Executive Summary of an ASTRO Clinical Practice Guideline. *Pract Radiat Oncol* 2019; **9**: 322-332 [PMID: 31474330 DOI: 10.1016/j.prro.2019.06.016]
- 23 **Hama Y**. Locally advanced pancreatic cancer successfully treated with high-dose helical tomotherapy. *Int Cancer Conf J* 2018; **7**: 152-155 [PMID: 31149536 DOI: 10.1007/s13691-018-0340-3]
- 24 **Lee JM**, Choi HS, Chun HJ, Kim ES, Keum B, Seo YS, Jeon YT, Lee HS, Um SH, Kim CD, Kim HB. EUS-guided irreversible electroporation using endoscopic needle-electrode in porcine pancreas. *Surg Endosc* 2019; **33**: 658-662 [PMID: 30374794 DOI: 10.1007/s00464-018-6425-4]
- 25 **Hicks AM**, Chou J, Capanu M, Lowery MA, Yu KH, O'Reilly EM. Pancreas Adenocarcinoma: Ascites, Clinical Manifestations, and Management Implications. *Clin Colorectal Cancer* 2016; **15**: 360-368 [PMID: 27262896 DOI: 10.1016/j.clcc.2016.04.014]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

