Pros and Cons of Laparoscopic Resection in Pancreatic Cancer Patients

John A. Stauffer, M.D.

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Outline

- Introduction
- Current literature
  - Distal pancreatectomy
  - Pancreaticoduodenectomy
- Practical application
- Future direction

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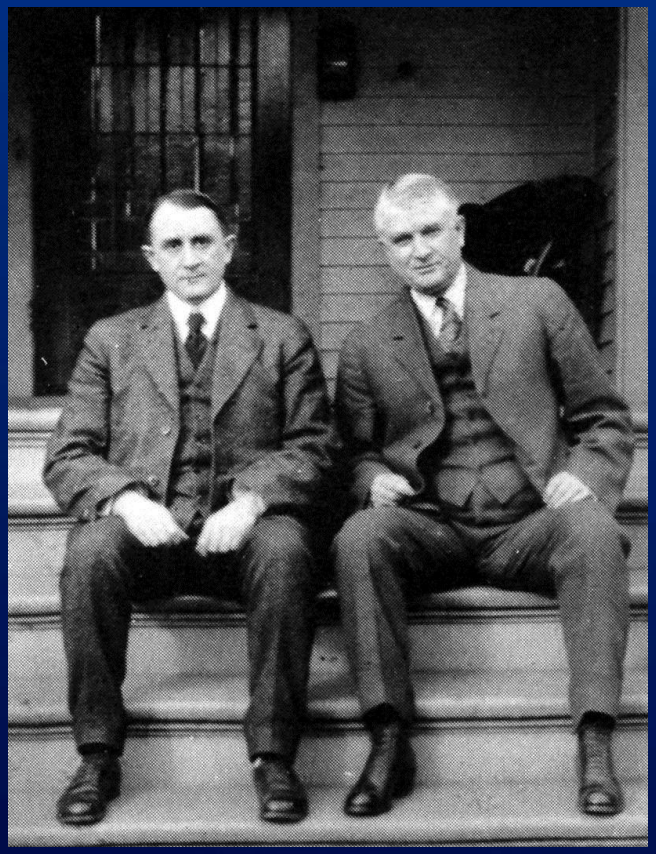


No financial disclosures

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Pros and **Cons** of Laparoscopic Resection in Pancreatic Cancer Patients

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The needs of the patient come first

Every surgeon is different:



- Training
- Experience
- Practice volume

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Introduction

- Associate Professor of Surgery at Mayo Clinic Florida (MCF)
- Training
  - 2005-2010: General Surgery residency at MCF
  - 2011: MIS/HPB fellowship at MCF
- Current practice (yearly x 7 years):
  - 40-50 whipple/total pancreatectomy
  - 25 distal pancreatectomy
  - 5 enucleation/central pancreatectomy

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MIS Pancreatectomy







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MIS Pancreatectomy

- Expectations and Opportunities:
  - Less blood loss
    - Decrease blood transfusion
  - More precise dissection
    - Magnified view
  - Faster recovery
    - Shorter LOS and less pain
  - Less complications
    - Improved ability to undergo adjuvant tx

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MIS Pancreatectomy

- Biases in Current Literature:
  - Selection bias
    - Tumor size
    - Vascular involvement
    - Neoadjuvant treatment
    - Extended or combined procedures
    - Obesity
    - Previous operations
  - Reporting bias
    - High volume vs Low volume center outcomes
    - Positive outcomes reporting

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Current Literature:

MIS Distal Pancreatectomy

Surgery 2015;157:45



A systematic review and meta-analysis of laparoscopic versus open distal pancreatectomy for benign and malignant lesions of the pancreas: It's time to randomize

Arianeb Mehrabi, MD,* Mohammadreza Hafezi, MD,* Jalal Arvin, MD, Majid Esmaeilzadeh, MD, Camelia Garoussi, MD, Golnaz Emami, MD, Julia Kössler-Ebs, MD, Beat Peter Müller-Stich, MD, Markus W. Büchler, MD, Thilo Hackert, MD, *and* Markus K. Diener, MD, *Heidelberg, Germany*

29 studies comparing LDP vs ODP

3701 patients (36% Lap, 64% Open)

Advantage LDP:
EBL
Time to oral intake
Hospital stay

No Differences:
Operative time
Morbidity and Mortality
Oncologic outcomes

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MIS Distal Pancreatectomy

HPB 2013;15, 149-155

ORIGINAL ARTICLE

Comparison of open with laparoscopic distal pancreatectomy: a single institution's transition over a 7-year period

John A. Stauffer, Armando Rosales-Velderrain, Ross F. Goldberg, Steven P. Bowers & Horacio J. Asbun

Department of General Surgery, Mayo Clinic, Jacksonville, FL, USA

82 LDP vs 90 ODP from 2005-2011

*Well matched by demographics and pathology

Advantage LDP:
EBL
pRBC transfusion
Hospital stay

No Differences:
Operative time
Morbidity and Mortality
Oncologic outcomes

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MIS Pancreaticoduodenectomy

Systematic Review & Meta-analysis overload…

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MIS Pancreaticoduodenectomy

Systematic Review & Meta-analysis overload…

Minimally-Invasive vs Open Pancreaticoduodenectomy: Systematic Review and Meta-Analysis

Camilo Correa-Gallego, MD, Helen E Dinkelspiel, MD, Isabel Sulimanoff, MLS, Sarah Fisher, MD, Eduardo F Viñuela, MD, T Peter Kingham, MD, FACS, Yuman Fong, MD, FACS, Ronald P DeMatteo, MD, FACS, Michael I D'Angelica, MD, William R Jarnagin, MD, FACS, Peter J Allen, MD, FACS

J Am Coll Surg 2014 6 studies, 542 patients – Lap/Open

MIS Pancreaticoduodenectomy

Systematic Review & Meta-analysis overload…



Minimally Invasive Surgical Approach Compared With Open Pancreaticoduodenectomy: A Systematic Review and Meta-analysis on the Feasibility and Safety

Purun Lei, MD, Bo Wei, PhD, Weiping Guo, MD, and Hongbo Wei, MD

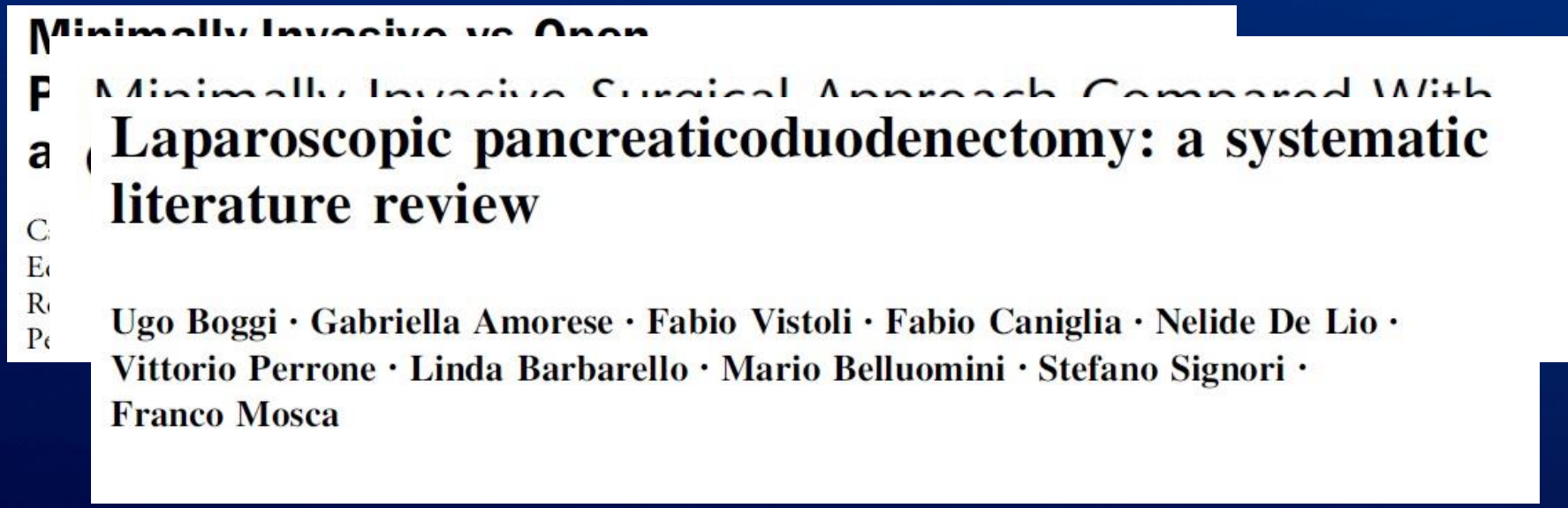
SLEPT 2014

9 studies, 638 patients – Lap/Open

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MIS Pancreaticoduodenectomy

Systematic Review & Meta-analysis overload…



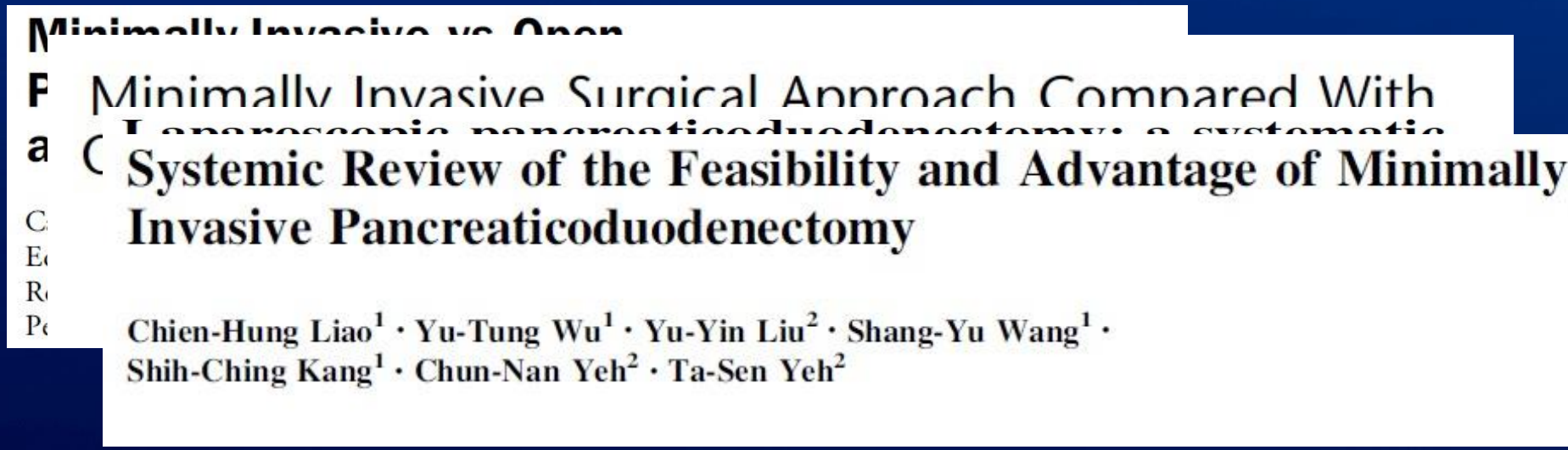
Laparoscopic pancreaticoduodenectomy: a systematic literature review

Ugo Boggi · Gabriella Amorese · Fabio Vistoli · Fabio Caniglia · Nelide De Lio · Vittorio Perrone · Linda Barbarello · Mario Belluomini · Stefano Signori · Franco Mosca

Surg Endosc 2015 25 studies, 746 Lap PD patients

MIS Pancreaticoduodenectomy

Systematic Review & Meta-analysis overload…



Minimally Invasive Surgical Approach Compared With

Systemic Review of the Feasibility and Advantage of Minimally Invasive Pancreaticoduodenectomy

Chien-Hung Liao[1] · Yu-Tung Wu[1] · Yu-Yin Liu[2] · Shang-Yu Wang[1] · Shih-Ching Kang[1] · Chun-Nan Yeh[2] · Ta-Sen Yeh[2]

WJS 2016

26 studies, 780 Lap PD & 248 Robotic PD

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MIS Pancreaticoduodenectomy

Systematic Review & Meta-analysis overload…

Advantages of LPD:
EBL
pRBC transfusion
Hospital stay
+/- Lymph node and LNR
+/- Margins

No Differences:
Pancreatic Fistula
DGE
PPH
Reoperation
Overall Morbidity
Mortality
Oncologic markers

Associated with LPD:
Longer operative time
Small tumor size
Conversion rate around 10-15%
Major Bias*

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MIS Pancreaticoduodenectomy

J Am Coll Surg 2012; 215(6), 810-9

Laparoscopic vs Open Pancreaticoduodenectomy: Overall Outcomes and Severity of Complications Using the Accordion Severity Grading System

Horacio J Asbun, MD, FACS, John A Stauffer, MD

53 LPD vs 215 OPD from 2005-2011

*Well matched by demographics and pathology

Advantages of LPD:
EBL
pRBC transfusion
ICU and Hospital stay
Lymph node and LNR

No Differences:
Morbidity and Mortality
Margins

*Longer op time: LPD

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MIS Pancreaticoduodenectomy

Unpublished

Updated retrospective review

168 LPD vs 165 OPD from 2008-2015

<u>OPD advantages over LPD:</u>
Operative time (323 vs 514 min)
Pancreatic fistula (4% vs 12%)
DGE (6% vs 15%)
Intra-abdominal abscess (7% vs 17%)
Hospital stay (7.5 vs 9.6 days)
Cost

<u>No Differences:</u>
EBL
PRBC transfusion
Overall Morbidity
Mortality
Oncologic markers

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MIS Pancreatectomy

- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)
    - Best level evidence
    - Cost, value, and QoL
    - Training, education and credentialing
    - Trial and registry design

HPB, March 2017. Volume 19, Issue 3

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MIS Pancreatectomy

- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)

Identifying key outcome metrics in pancreatic surgery, and how to optimally achieve them

Claudio Bassi & Stefano Andrianello

Metrics

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MIS Pancreatectomy

- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)

Standardizing terminology for minimally invasive pancreatic resection

Andre L. Montagnini[1], Bård I. Røsok[2], Horacio J. Asbun[3], Jeffrey Barkun[4], Marc G. Besselink[5], Ugo Boggi[6], Kevin C.P. Conlon[7], Abe Fingerhut[8], Ho-Seong Han[9], Paul D. Hansen[10], Melissa E. Hogg[11], Michael L. Kendrick[12], Chinnusamy Palanivelu[13], Shailesh V. Shrikhande[14], Go Wakabayashi[15], Herbert Zeh[11], Charles M. Vollmer[16] & David A. Kooby[17]

Terminology

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MIS Pancreatectomy

- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)

Worldwide survey on opinions and use of minimally invasive pancreatic resection

Jony van Hilst[1], Thijs de Rooij[1], Mohammed Abu Hilal[2], Horacio J. Asbun[3], Jeffrey Barkun[4], Uggo Boggi[5], Olivier R. Busch[1], Kevin C.P. Conlon[6], Marcel G. Dijkgraaf[7], Ho-Seong Han[8], Paul D. Hansen[9], Michael L. Kendrick[10], Andre L. Montagnini[11], Chinnusamy Palanivelu[12], Bård I. Røsok[13], Shailesh V. Shrikhande[14], Go Wakabayashi[15], Herbert J. Zeh[16], Charles M. Vollmer[17], David A. Kooby[18] & Marc G.H. Besselink[1]

Current worldwide use

MIS Pancreatectomy

- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)

Minimally invasive distal pancreatectomy

Bård I. Røsok[1], Thijs de Rooij[2], Jony van Hilst[2], Markus K. Diener[3], Peter J. Allen[4], Charles M. Vollmer[5], David A. Kooby[6], Shailesh V. Shrikhande[7] & On behalf of the Organizing Committee for the State of the Art Conference on Minimally Invasive Pancreas Resection

Distal pancreatectomy

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MIS Pancreatectomy

- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)

Minimally invasive pancreatoduodenectomy

Michael L. Kendrick[1], Jony van Hilst[2], Ugo Boggi[3], Thijs de Rooij[2], R. Matthew Walsh[4], Herbert J. Zeh[5], Steven J. Hughes[6], Yoshiharu Nakamura[7], Charles M. Vollmer[8], David A. Kooby[9], Horacio J. Asbun[10] & the Minimally Invasive Pancreatic Resection Organizing Committee

Pancreatoduodenectomy

MIS Pancreatectomy

- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)

Minimally invasive pancreatic resections: cost and value perspectives

Kevin C. Conlon[1], Thijs de Rooij[2], Jony van Hilst[2], Mohammad Abu Hidal[3], Julie Fleshman[4], Mark Talamonti[5], Tsafrir Vanounou[6], Richard Garfinkle[6], Vic Velanovich[7], David Kooby[8], Charles M. Vollmer[9] & the Minimally Invasive Pancreatic Resection Organizing Committee

Cost and value

MIS Pancreatectomy

- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)

Training in Minimally Invasive Pancreatic Resections: a paradigm shift away from "See one, Do one, Teach one"

Melissa E. Hogg[1], Marc G. Besselink[2], Pierre-Alain Clavien[3], Abe Fingerhut[4], D. Rohan Jeyarajah[5], David A. Kooby[6], A. James Moser[7], Henry A. Pitt[8], Oliver A. Varban[9], Charles M. Vollmer[10], Herbert J. Zeh III[1], Paul Hansen[11] & the Minimally Invasive Pancreatic Resection Organizing Committee

Training

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- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)

Research considerations in the evaluation of minimally invasive pancreatic resection (MIPR)

Jeffrey Barkun[1], William Fisher[4], Giana Davidson[3], Go Wakabayashi[10], Marc Besselink[2], Henry Pitt[7], Jane Holt[5], Steve Strasberg[8], Charles Vollmer[9], David Kooby[6] & The Minimally Invasive Pancreatic Resection Organizing Committee

Research

MIS Pancreatectomy

- Consensus conference:
  - IHPBA, Sao Paulo Brazil 2016 focusing on minimally invasive pancreatic resection (MIPR)

?

Pancreatic cancer

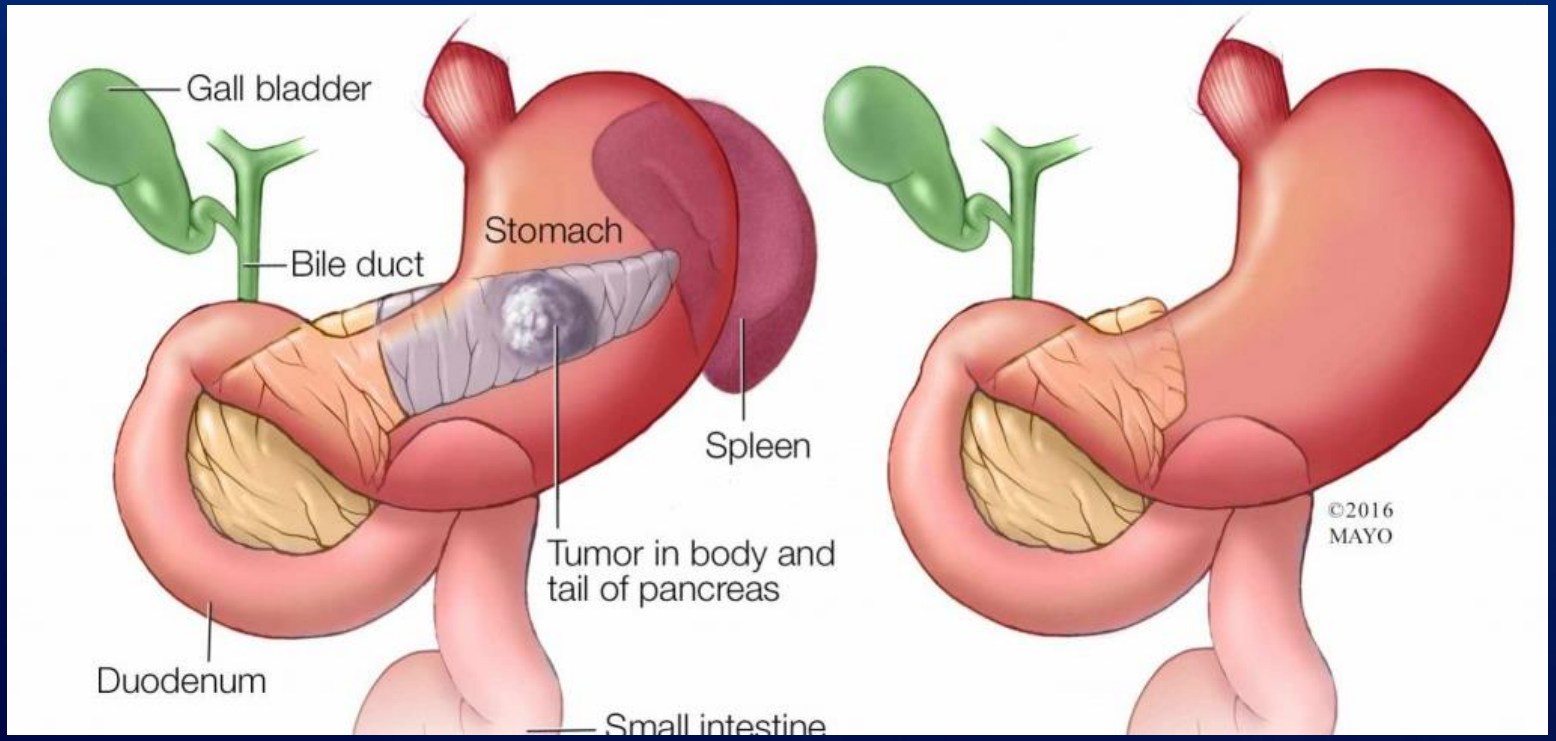
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MIS Pancreatectomy for Pancreatic Cancer

Is there a difference??

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MIS Distal Pancreatectomy for PDAC



MIS Distal Pancreatectomy for PDAC

World J Surg (2016) 40:1477–1484
DOI 10.1007/s00268-016-3412-6

World Journal of Surgery

CrossMark

ORIGINAL SCIENTIFIC REPORT

Laparoscopic Versus Open Distal Pancreatectomy for Pancreatic Adenocarcinoma

John A. Stauffer[1] · Alessandro Coppola[3] · Kabir Mody[2] · Horacio J. Asbun[1]

- 44 LDP vs 28 ODP from 1995 – 2014

Advantages of LDP:
EBL/pRBC transfusion
Hospital stay
Higher lymph node harvest
Shorter time to initiate adjuvant tx

No Differences:
Pancreatic Fistula
Morbidity/Mortality
Use of adjuvant therapy
Survival – **41% at 5 years**

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MIS Distal Pancreatectomy for PDAC

A Comparative Study of Laparoscopic vs Open Distal Pancreatectomy for Left-Sided Ductal Adenocarcinoma: A Propensity Score-Matched Analysis

Sang Hyun Shin, MD, Song Cheol Kim, MD, PhD, Ki Byung Song, MD, PhD, Dae Wook Hwang, MD, Jae Hoon Lee, MD, PhD, Dongjoo Lee, MD, Jung Woo Lee, MD, Eunsung Jun, MD, Kwang-Min Park, MD, PhD, Young-Joo Lee, MD, PhD

J Am Coll Surg 2015; 220(2)

- 51 LDP vs 51 ODP from 2006 – 2013

Advantages of LDP:
Return to oral intake
Hospital stay

No Differences:
Morbidity/Mortality
Oncologic outcomes
Use of adjuvant therapy
Survival

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MIS Distal Pancreatectomy for PDAC

Surg Endosc (2016) 30:3409–3418
DOI 10.1007/s00464-015-4623-x

Laparoscopic distal pancreatectomy for pancreatic ductal adenocarcinoma: results of a multicenter cohort study on 196 patients

Mushegh A. Sahakyan[1,2,3] · Airazat M. Kazaryan[1,4] · Majd Rawashdeh[5] · David Fuks[6,7] · Mark Shmavonyan[1,2] · Sven-Petter Haugvik[8,9] · Knut Jørgen Labori[8] · Trond Buanes[2,8] · Bård Ingvald Røsok[8] · Dejan Ignjatovic[10] · Mohammad Abu Hilal[5] · Brice Gayet[6,7] · Song Cheol Kim[11] · Bjørn Edwin[1,2,8]

- Multicenter collaboration
- 196 LDP from 2002 – 2015

LDP:
Morbidity: 32%
Pancreatic fistula: 16%
Median survival: 31.3 months
5-year survival: 30%

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MIS Distal Pancreatectomy for PDAC

The laparoscopic approach to distal pancreatectomy for ductal adenocarcinoma results in shorter lengths of stay without compromising oncologic outcomes

Susan M. Sharpe, M.D.[a], Mark S. Talamonti, M.D.[b], Edward Wang, Ph.D.[b], David J. Bentrem, M.D.[c], Kevin K. Roggin, M.D.[a], Richard A. Prinz, M.D.[b], Robert D. W. Marsh, M.D.[b], Susan J. Stocker, C.C.R.P.[b], David J. Winchester, M.D.[b], Marshall S. Baker, M.D., M.B.A.[b,*]

Am J Surg 2015; 209, 557-563

- National Cancer DataBase (NCDB)
- 2011 – 2012
- 144 LDP vs 625 OPD

LDP:
Shorter hospital stay
All 30-day outcomes similar
Similar surrogate oncologic outcomes

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MIS Distal Pancreatectomy for PDAC



ORIGINAL ARTICLE

Reduced morbidity with minimally invasive distal pancreatectomy for pancreatic adenocarcinoma

Anastasia Plotkin[1], Eugene P. Ceppa[1], Ben L. Zarzaur[1], Elizabeth M. Kilbane[2], Taylor S. Riall[3] & Henry A. Pitt[4]

HPB 2017;19, 279-285

- ACS-NSQIP
- 2011 – 2014
- 163 LDP vs 335 OPD

LDP:
Lower morbidity
Shorter LOS
Similar surrogate oncologic outcomes

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MIS Distal Pancreatectomy for PDAC

Impact of minimally invasive vs. open distal pancreatectomy on use of adjuvant chemoradiation for pancreatic adenocarcinoma

Kevin L. Anderson Jr. [a], Mohamed A. Adam [b], Samantha Thomas [c, d], Sanziana A. Roman [b, d], Julie A. Sosa [b, d, e, f, *]

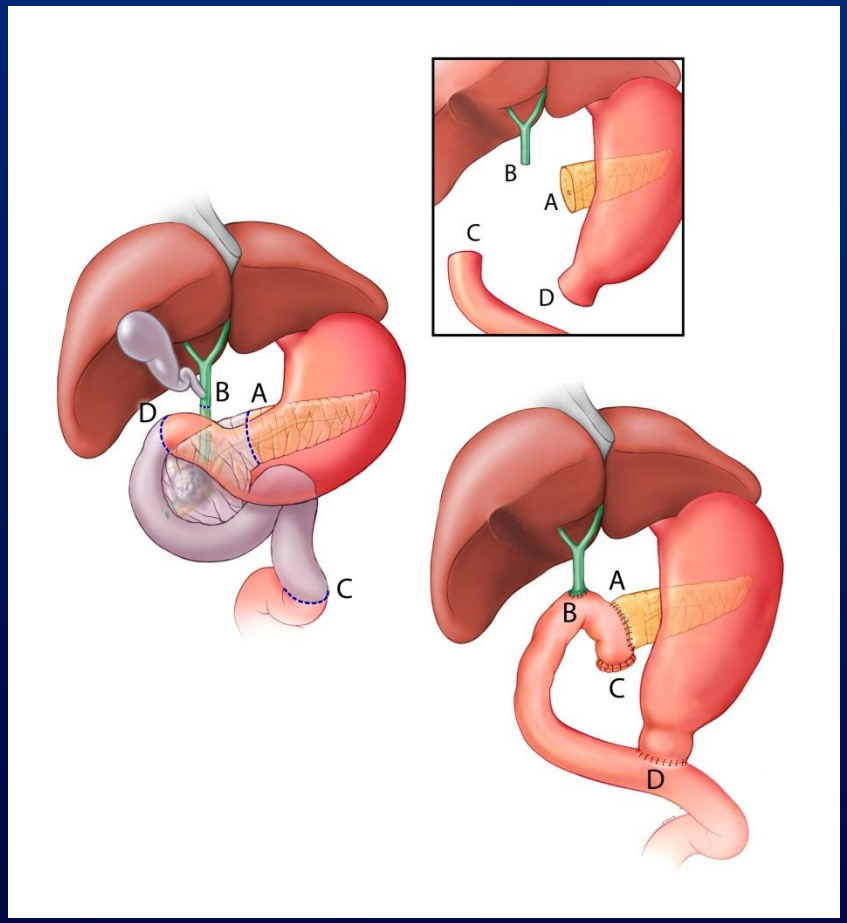
Am J Surg 2017; 213, 601-605

- National Cancer DataBase (NCDB)
- 2010 – 2012
- 505 MIS-DP vs 1302 OPD

MIS-DP:
Superior short term outcomes
Increased use of adjuvant chemotx

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MIS Pancreaticoduodenectomy for PDAC



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MIS Pancreaticoduodenectomy for PDAC

Laparoscopic versus open pancreaticoduodenectomy for pancreatic adenocarcinoma: long-term results at a single institution

John A. Stauffer[1] · Alessandro Coppola[2] · Diego Villacreses[1] · Kabir Mody[3] · Elizabeth Johnson[3] · Zhuo Li[4] · Horacio J. Asbun[1]

Surg Endosc 2017; 31(5), 2233-2241

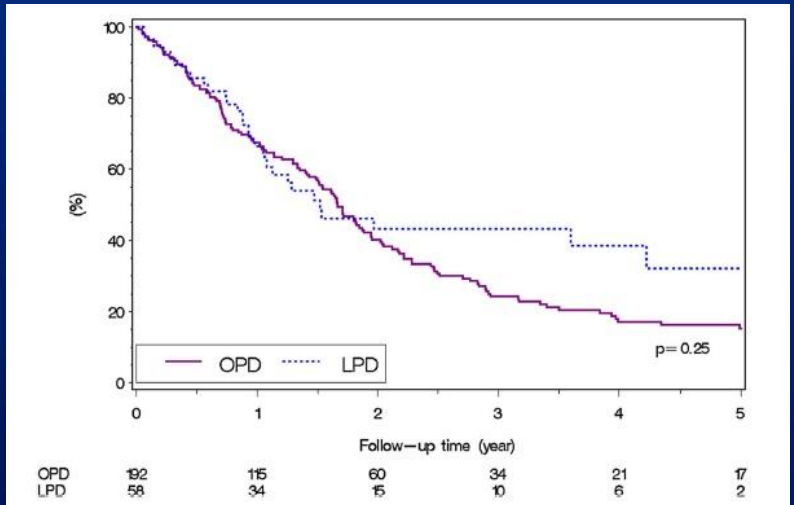
- Mayo Clinic Florida
- PD for PDAC; 1995 – 2014
- 58 LPD vs 193 OPD

Results:
Similar demographics
Expected short term differences
Same time to initiate adjuvant tx
Similar use of adjuvant tx
Similar long-term survival

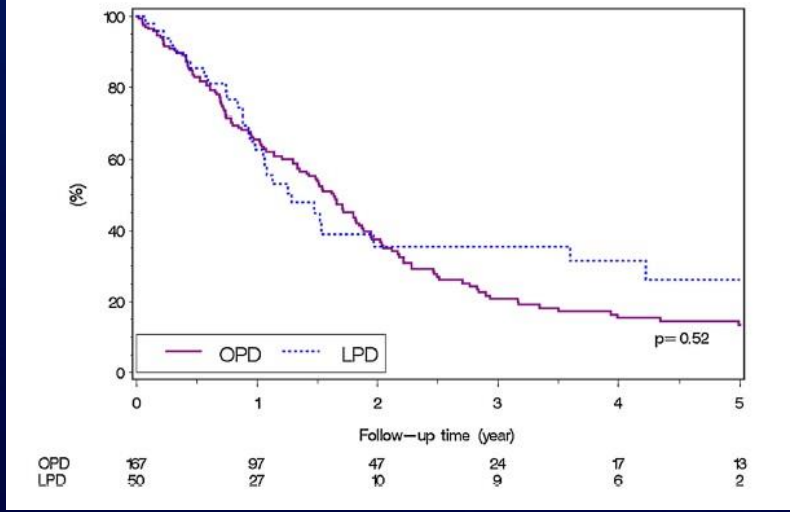
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MIS Pancreaticoduodenectomy for PDAC

Stage I



Stage II



5-year survival:

LPD – 32%

OPD – 15%

P= 0.249

Surg Endosc 2017; 31(5), 2233-2241

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MIS Pancreaticoduodenectomy for PDAC

Multivariate analysis for survival:

Variable	Univariate		Multivariate	*p* value
	HR (95 % CI)	*p* value	HR (95 % CI)	
Age > 65 years	1.2 (0.87, 1.65)	0.263		
BMI (kg/m^2)	0.99 (0.96, 1.02)	0.385		
Time period 1/2*	1.07 (0.76, 1.5)	0.694		
Tumor size (>3 cm)	1.51 (1.12, 2.03)	**0.007**	1.37 (0.99, 1.88)	0.055
Complications (minor)	1.13 (0.79, 1.62)	0.499		
Complications (major)	1.74 (1.19, 2.54)	**0.004**	1.77 (1.18, 2.65)	**0.006**
Operative time (>6 h)	1.4 (0.87, 2.26)	0.163		
Estimated blood loss (>500 mL)	1.54 (1.12, 2.1)	**0.007**	1.31 (0.93, 1.85)	0.117
Positive margins (R_1/R_2)	1.94 (1.38, 2.72)	**<0.001**	1.56 (1.06, 2.3)	**0.025**
Lymph node harvest (<20)	0.92 (0.68, 1.24)	0.567		
Lymph node ratio (>0.2)	2.11 (1.55, 2.89)	**<0.001**	1.91 (1.36, 2.7)	**<0.001**
LPD versus OPD	0.79 (0.53, 1.18)	0.25		

Bold values are statistically significant *p* values

BMI body mass index

* Time period 1 = 1995–2004, Time period 2 = 2005–2014

Surg Endosc 2017; 31(5), 2233-2241

MIS Pancreaticoduodenectomy for PDAC

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Surg Endosc 2017; 31(5), 2233-2241

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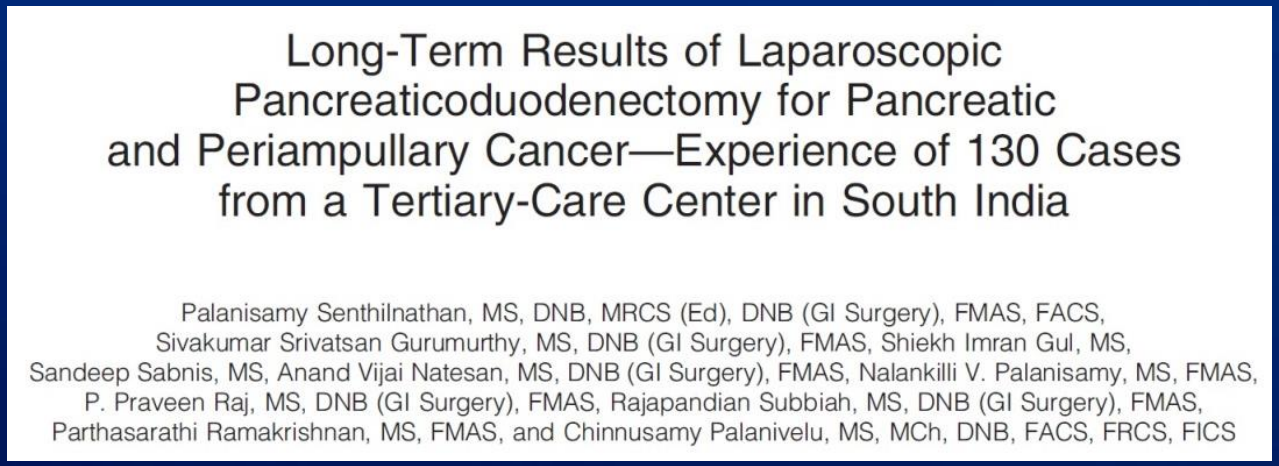
Bold values are statistically significant *p* values

BMI body mass index

* Time period 1 = 1995–2004, Time period 2 = 2005–2014

Surg Endosc 2017; 31(5), 2233-2241

MIS Pancreaticoduodenectomy for PDAC



Long-Term Results of Laparoscopic Pancreaticoduodenectomy for Pancreatic and Periampullary Cancer—Experience of 130 Cases from a Tertiary-Care Center in South India

Palanisamy Senthilnathan, MS, DNB, MRCS (Ed), DNB (GI Surgery), FMAS, FACS, Sivakumar Srivatsan Gurumurthy, MS, DNB (GI Surgery), FMAS, Shiekh Imran Gul, MS, Sandeep Sabnis, MS, Anand Vijai Natesan, MS, DNB (GI Surgery), FMAS, Nalankilli V. Palanisamy, MS, FMAS, P. Praveen Raj, MS, DNB (GI Surgery), FMAS, Rajapandian Subbiah, MS, DNB (GI Surgery), FMAS, Parthasarathi Ramakrishnan, MS, FMAS, and Chinnusamy Palanivelu, MS, MCh, DNB, FACS, FRCS, FICS

JLAST 2015; 25(4)

- Single center experience (15 years)
- 130 LPD for periampullary malignancy
  - 58 PDAC
  - 41 Ampullary CA
  - 21 distal CCA
  - 10 Duodenal CA

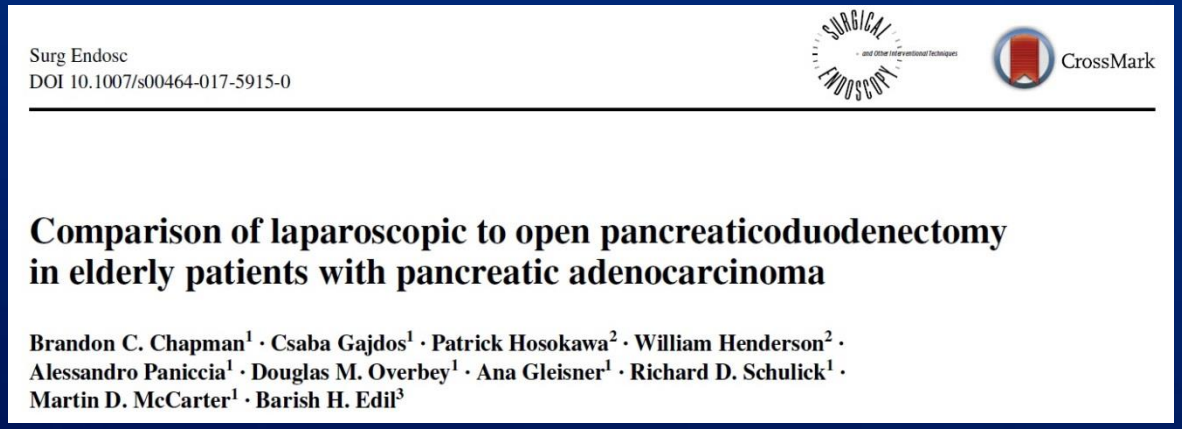
Results:

Short term –
- R0: 91%
- LN: 18

Long term –
- Median survival: 33 months
- 5-year survival: 29%

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MIS Pancreaticoduodenectomy for PDAC



Surg Endosc
DOI 10.1007/s00464-017-5915-0

Comparison of laparoscopic to open pancreaticoduodenectomy in elderly patients with pancreatic adenocarcinoma

Brandon C. Chapman[1] · Csaba Gajdos[1] · Patrick Hosokawa[2] · William Henderson[2] · Alessandro Paniccia[1] · Douglas M. Overbey[1] · Ana Gleisner[1] · Richard D. Schulick[1] · Martin D. McCarter[1] · Barish H. Edil[3]

- National Cancer DataBase (NCDB)
- 2010 – 2013
- Age ≥ 75, PDAC
- 248 LPD vs 1520 OPD

Results:
No difference in LN, margins, adjuvant tx factors
Lower 90 day mortality for LPD (7% vs 12%)
Median survival longer for LPD (20 vs 16 months)

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MIS Pancreaticoduodenectomy for PDAC

Laparoscopic Pancreaticoduodenectomy Should Not Be Routine for Resection of Periampullary Tumors

Safi Dokmak, MD, Fadhel Samir Ftériche, MD, Béatrice Aussilhou, MD, Yacine Bensafta, MD, Philippe Lévy, MD, Philippe Ruszniewski, MD, Jacques Belghiti, MD, Alain Sauvanet, MD

J Am Coll Surg 2015; 220 (5)

- Single center experience (France)
- 2011 – 2014
- 46 LPD vs 46 OPD
- 30% for PDAC

LPD results:
Longer operative times (342 vs 264 min)
Higher PF (24% vs 6%)
Higher PPH (24% vs 7%)
Higher morbidity and reoperation (NS)

Similar oncologic outcomes:
(Lymph nodes and margins)

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MIS Pancreaticoduodenectomy for PDAC

Surg Endosc (2017) 31:3459–3474
DOI 10.1007/s00464-016-5395-7

REVIEW

Totally laparoscopic or robot-assisted pancreaticoduodenectomy versus open surgery for periampullary neoplasms: separate systematic reviews and meta-analyses

Sang Hyun Shin[1] · Ye-Jee Kim[2] · Ki Byung Song[1] · Seong-Ryong Kim[1] · Dae Wook Hwang[1] · Jae Hoon Lee[1] · Kwang-Min Park[1] · Young-Joo Lee[1] · Eunsung Jun[3] · Song Cheol Kim[1]

- 8 studies - 450 LPD
- 5 studies – 160 Robotic PD
- All retrospective non-randomized

MIS-PD:
Safe and comparable to OPD

*Randomized and Prospective studies are needed

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Practical use of MIS for PDAC

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Practical use of MIS for PDAC

- Laparoscopy for left sided PDAC:
  - Distal pancreatectomy
  - Subtotal pancreatectomy
  - Large bulky tumors *
  - Multivisceral resection *
  - Appleby *

*Consider hybrid with midline approach

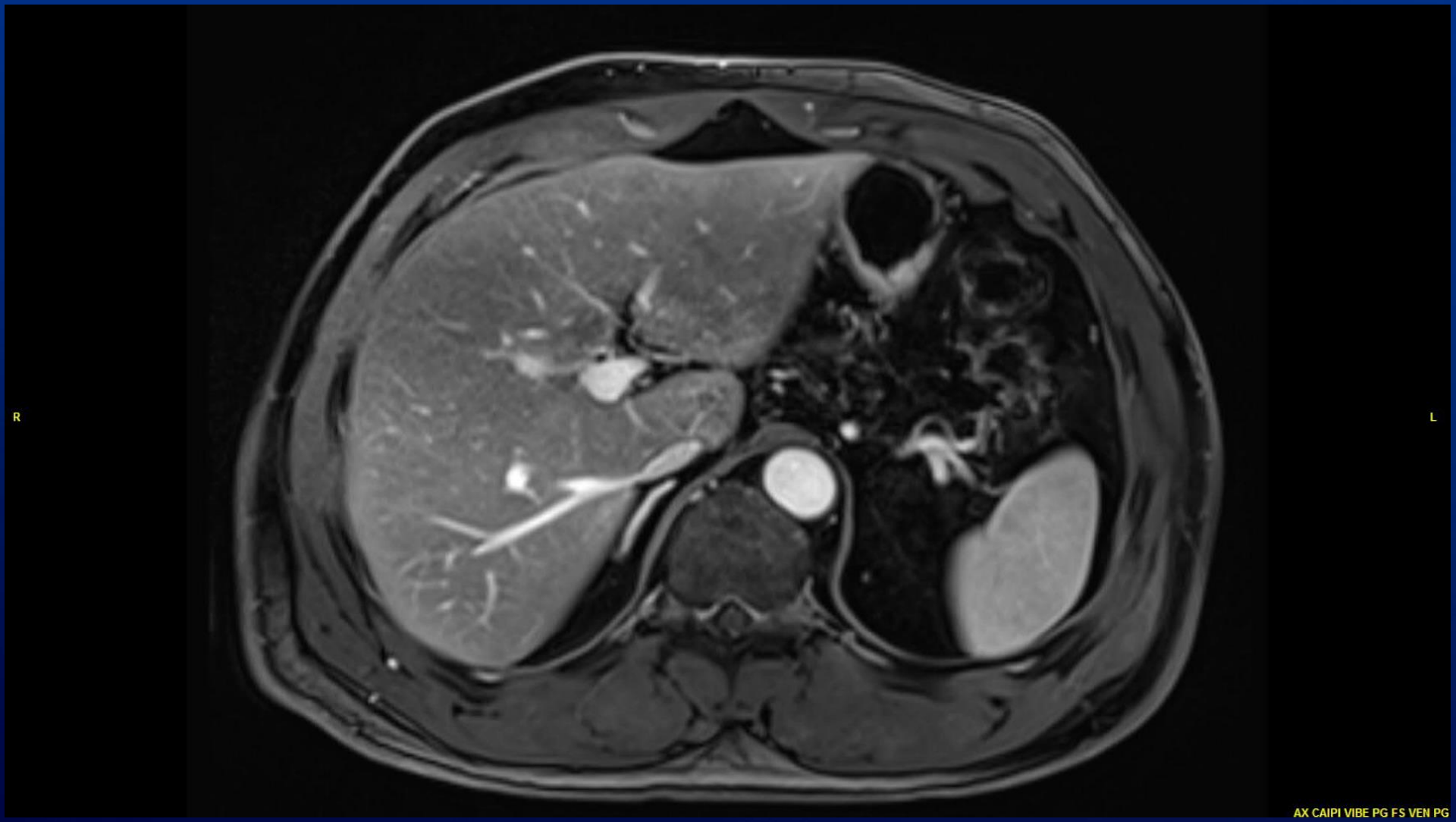
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Laparoscopic subtotal pancreatectomy with anterior RAMPS

72 year old male with mass in the body of the pancreas

Biopsy = PDAC

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Laparoscopic subtotal pancreatectomy with anterior RAMPS

3 day hospital stay

No complications

Recovered within 3 weeks of surgery

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Practical use of MIS for PDAC

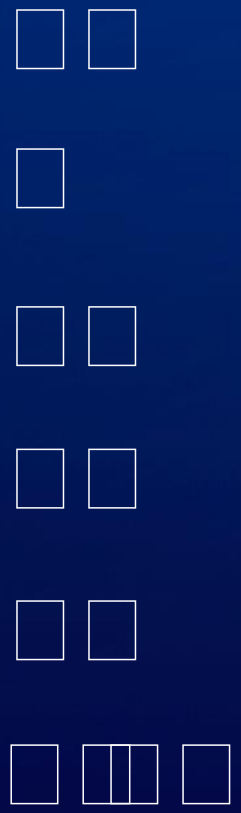
- Laparoscopy for proximal PDAC:
  - Pancreaticoduodenectomy
  - Total pancreatectomy *

*Consider hybrid with midline approach

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Practical use of MIS for PDAC

- Laparoscopy for proximal PDAC:
  - Young patient
  - Obesity
  - Large bulky tumors
  - Pancreatitis
  - Neoadjuvant therapy
  - Vascular/multivisceral resection



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Conclusion and Future Directions for MIS Pancreatectomy for PDAC

- Laparoscopy is here to stay
- Benefits patients with pancreatic cancer
  - Decreasing impact of surgery
  - Quality of life
- Robotics
- Unconventional/Radical surgery ≠ laparoscopy

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Locations



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Thank You

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Questions & Discussion