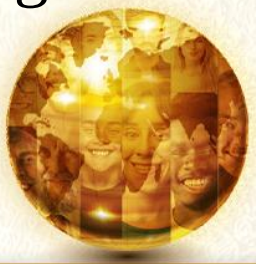
Vascular (SM/PV) Reconstruction in periampullary tumors

is there a difference????

Prof. Dr: Taha Yassein, MD 2024

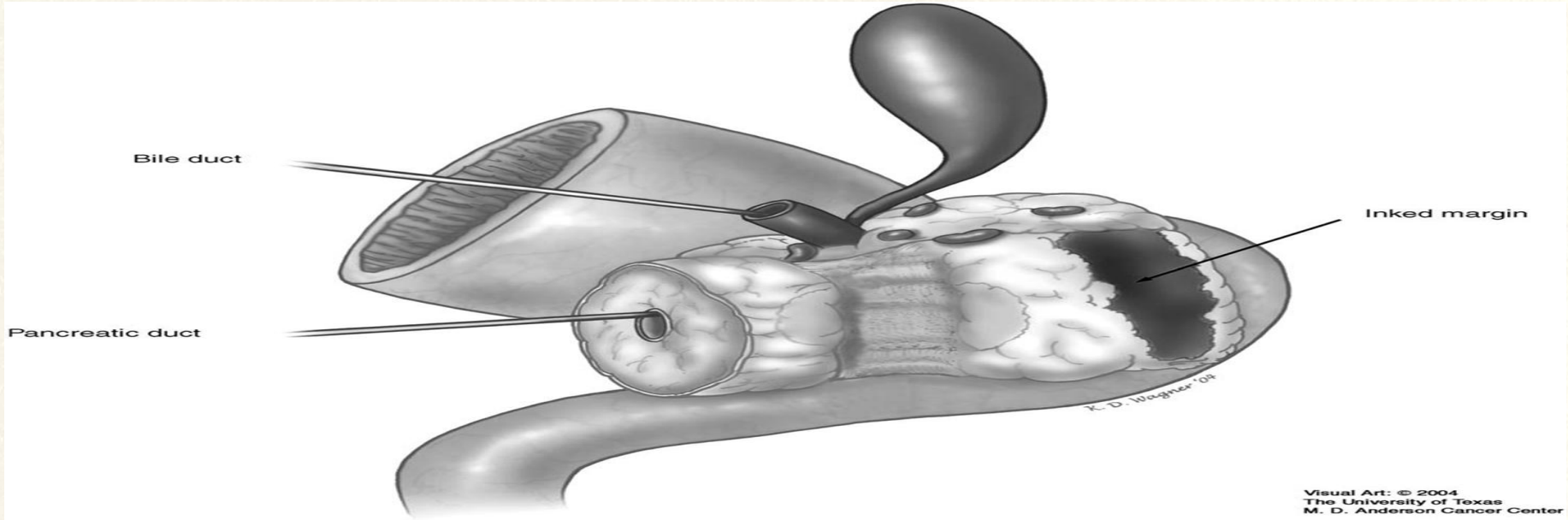
Introduction

- Surgical resection remains the treatment of choice and only hope for long-term survival for patients with pancreatic cancer.
- Complete clearance of macroscopic tumor with negative microscopic resection margins is the main surgical objective, as patients with residual disease demonstrate survival rates similar to those treated palliative.
- Numerous studies have supported the safety and feasibility of combining PD with vascular resection in an attempt to obtain negative margins.



Introduction

- Pancreaticoduodenectomy (PD):is the only chance for cure.
  - Mortality rates ranges from 0-8%.
  - 5 year survival after resection ranges from 7-25%.



SMV &Pancreatic Tumors-Theory

- Grossly positive margins after resection associated with early recurrence.
- Close relationship between pancreatic head and SMV.
- Barriers to margin free resection include tumor involvement of SMV.
- Invasion of SMV can occur without retroperitoneal invasion.
- SMV not always accurately defined on pre-operative imaging

SM/PV invasion:

- Loss of the fat plane on CT.
- Absence of normal pancreatic parenchyma between the low-density tumor and the vein wall.

Portal venous (PV)resection

- Mortality rate of PV resection 30 years ago was > 20% now decreased to 5%
- Requires suitable vein proximal and distal to tumor involvement for resection and reconstruction.
- Intra-operatively difficult to determine whether PV adherence is due to direct tumor invasion or inflammatory reaction , majority of cases have tumor invasion justifying PV resection.
- Planned venous resections have better complete R0 resection rate than unplanned resection

- *Kim PTW, Wei AC 2013*

NCCN Practice Guidelines v.1.2023

National Comprehensive Cancer Network

Resectable

1. No distant metastases
2. Clear fat plane around celiac and superior mesenteric artery.
3. Patent SMV/PV

Borderline Resectable

1. Severe unilateral or bilateral SMV/portal impingement
2. Less than 180 degree tumor abutment of SMA
3. Abutment or encasement of hepatic artery, if reconstructible.
4. SMV occlusion, if of a short segment, and reconstructible.
5. SMA or celiac encasement <180 degrees.

Unresectable

1. Distant Metastases
2. Greater than 180 degree SMA encasement, any celiac abutment.
3. Unreconstructible SMV/Portal Vein
4. Aortic invasion or encasement.
5. Metastases to lymph nodes beyond the field of resection.

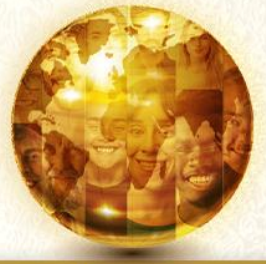
Veins with borderline resectability

1. **PV &SMV** : Tumor engagement of the portal bifurcation *(not peripheral to the division of the SMV into jejunal branches are considered to be signs of irresectability).*
2. **Only a short total occlusion (≤2cm):** Where PV above and SMV below are of adequate size for a safe anastomosis.
3. **Tumor encasement of the anterior part (≤25%) of the IVC :**Is considered to be compatible with resectability including the confluence of the left renal vein and the caval vein.

Tension Free Anastomosis SMV/PV

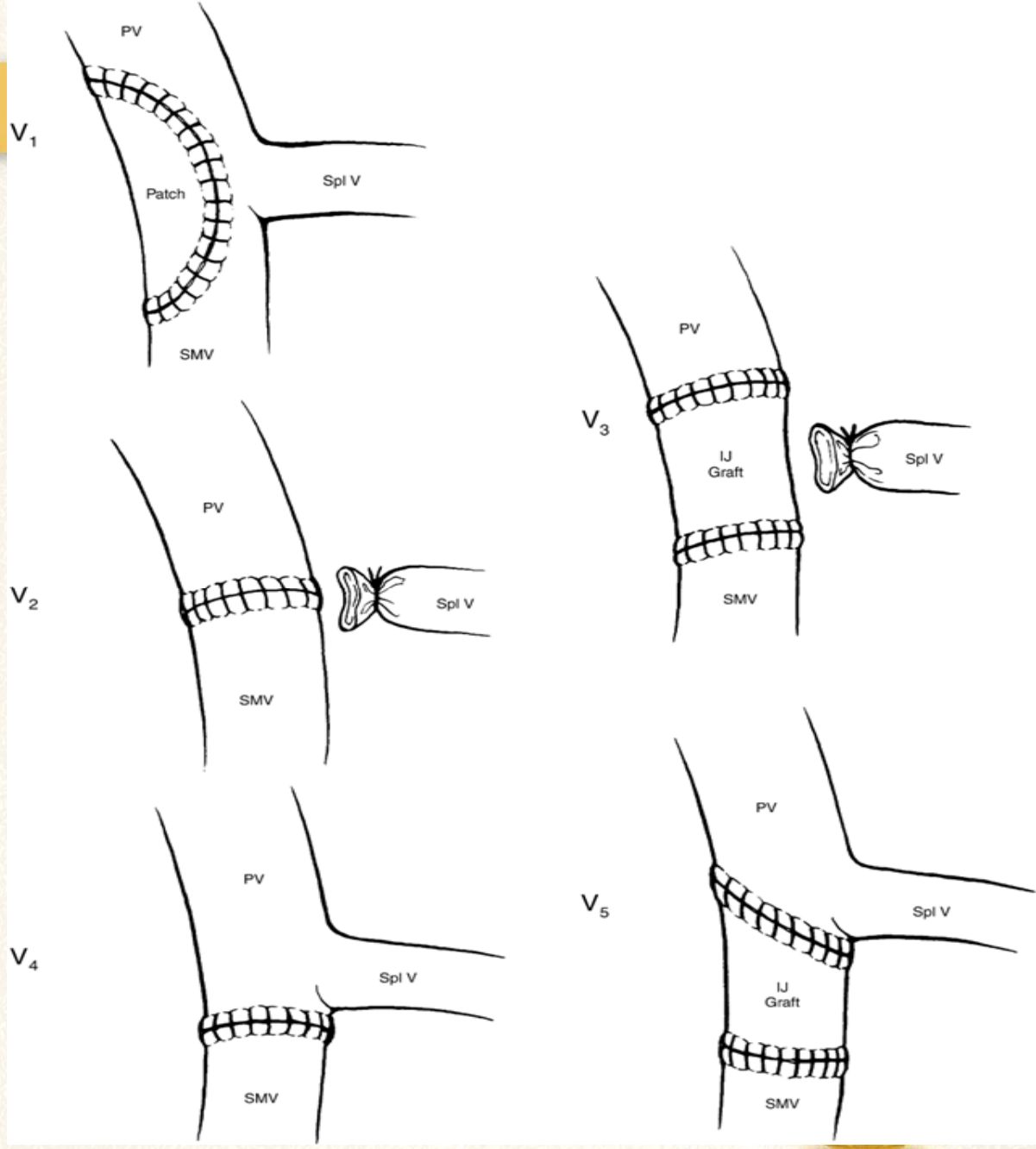
- To gain enough mobility of the distal SMV for a tension free anastomosis it is essentially to mobilize the root of the mesentery completely.

- This technique was accomplished by dividing the attachment of the mesentery of the ilium &RT colon from the retroperitoneal plane up to the base of the small bowel mesentery with antero,rostal elevation of small bowel .



Reconstruction options

- **V1** –Tangential resection with saphenous vein patch.
- **V2** – Segmental resection with splenic vein ligation and primary anastomosis.
- **V3** – Segmental resection with splenic vein ligation and interposition graft.
- **V4** – Segmental resection without splenic vein ligation and primary anastomosis.
- **V5** – Segmental resection without splenic vein ligation and interposition graft

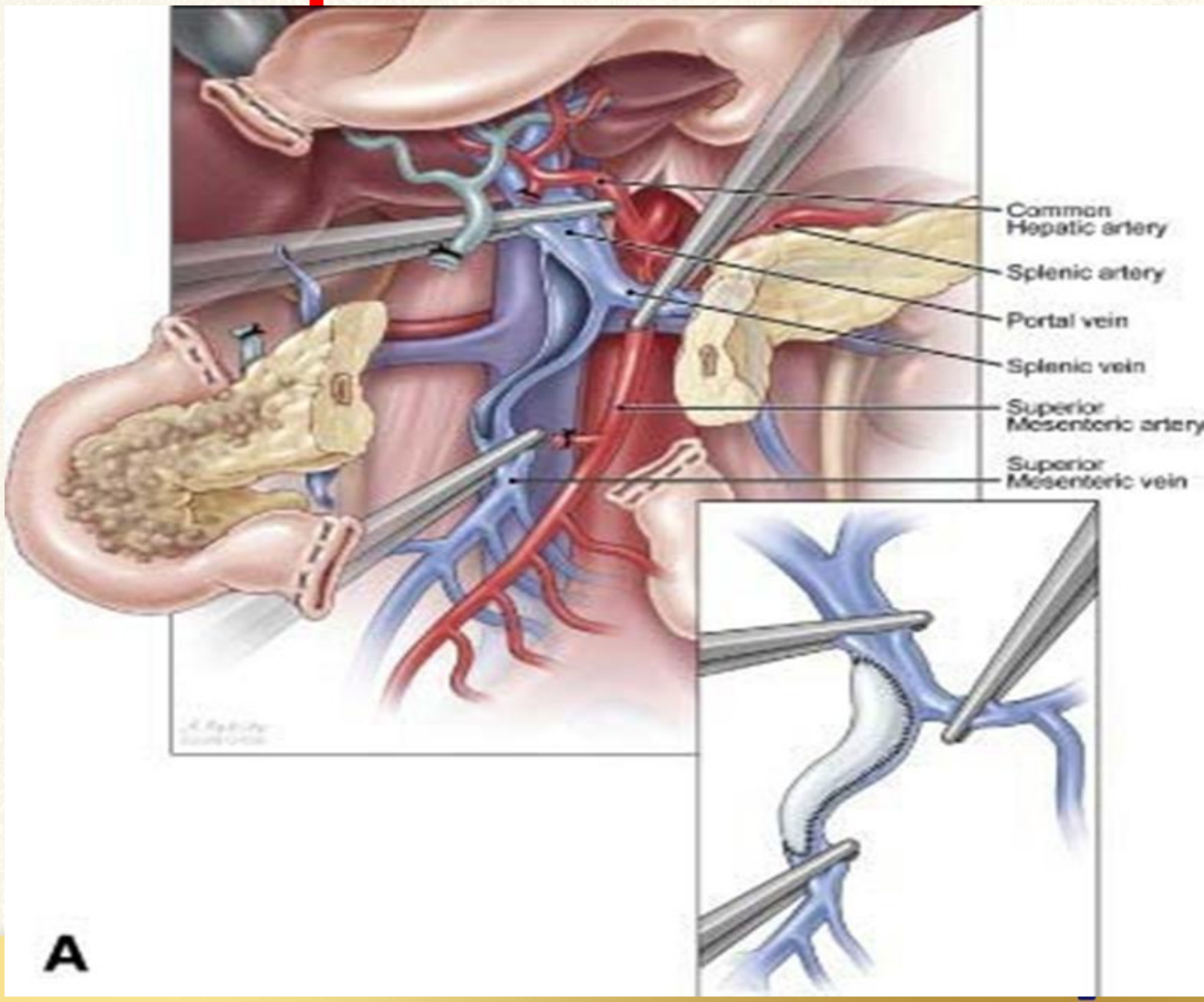


A.Available SMV/PVR techniques

Vein Patch

- Greater Saphenous Vein
- Renal Vein
- Internal Jugular Vein

➢ ***Choice for less extensive tumor involvement (< 1/3 vessel circumference***)



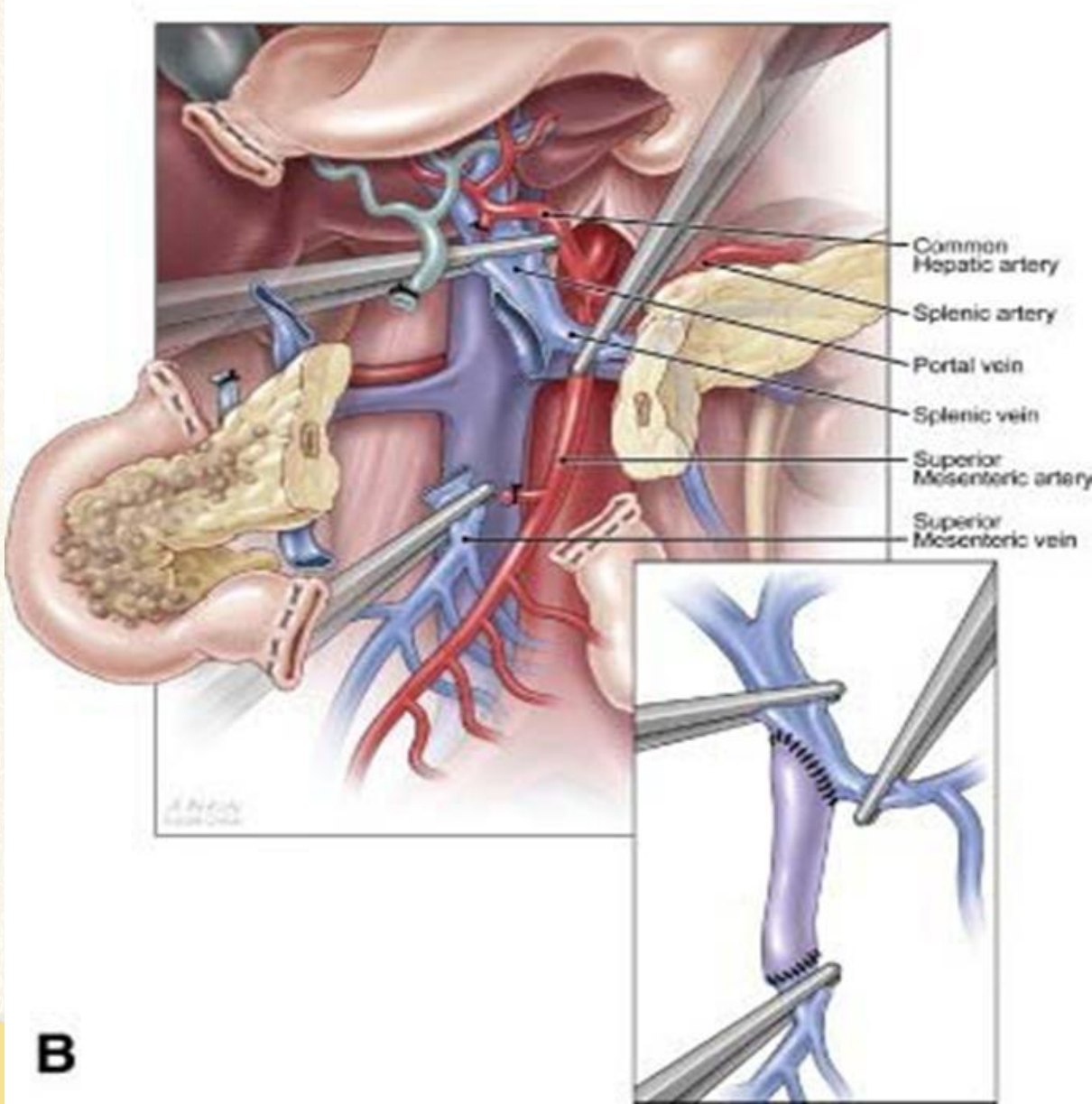
B.Interposition Grafting

More extensive tumor involvement (> 1/3 vessel circumference)

Splenic vein can be ligated or reimplanted in side of interposition graft.

Graft types

1. Splenic vein
2. Left Renal Vein
3. Internal Jugular
4. Ovarian Vein
5. Femoral Vein



Aim of the work

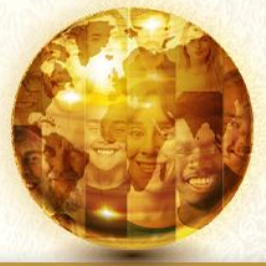
- To evaluate the impact of ***vascular reconstruction*** on the early postoperative outcome after resection of periampullary tumors.

Patient and methods

- From January 2020 to October 2023,114 patients underwent PD for periampullary tumors in National Liver Institute, Monuofia University.
- Patients who underwent PD with vascular resection (N=18) were compared to patients who underwent standard PD (N=96) as regard:
- Vascular reconstructions were performed due to: vascular invasion in 14 patients and vascular injury in another 4 patients.
- Vascular reconstructions were performed with resection of the involved vascular segment with: primary repair (N=12), vein patch (N=4), & interposition grafting in 2 patients.

Demographics

	PD+VR (n=18)	Standard PD (n=96)
Gender, n (%)		
Male	11(61.1%)	58(60.4%)
Female	7(38.9%)	38(39.6%)
Age:		
Range	39-72	23-82
Mean	56	52



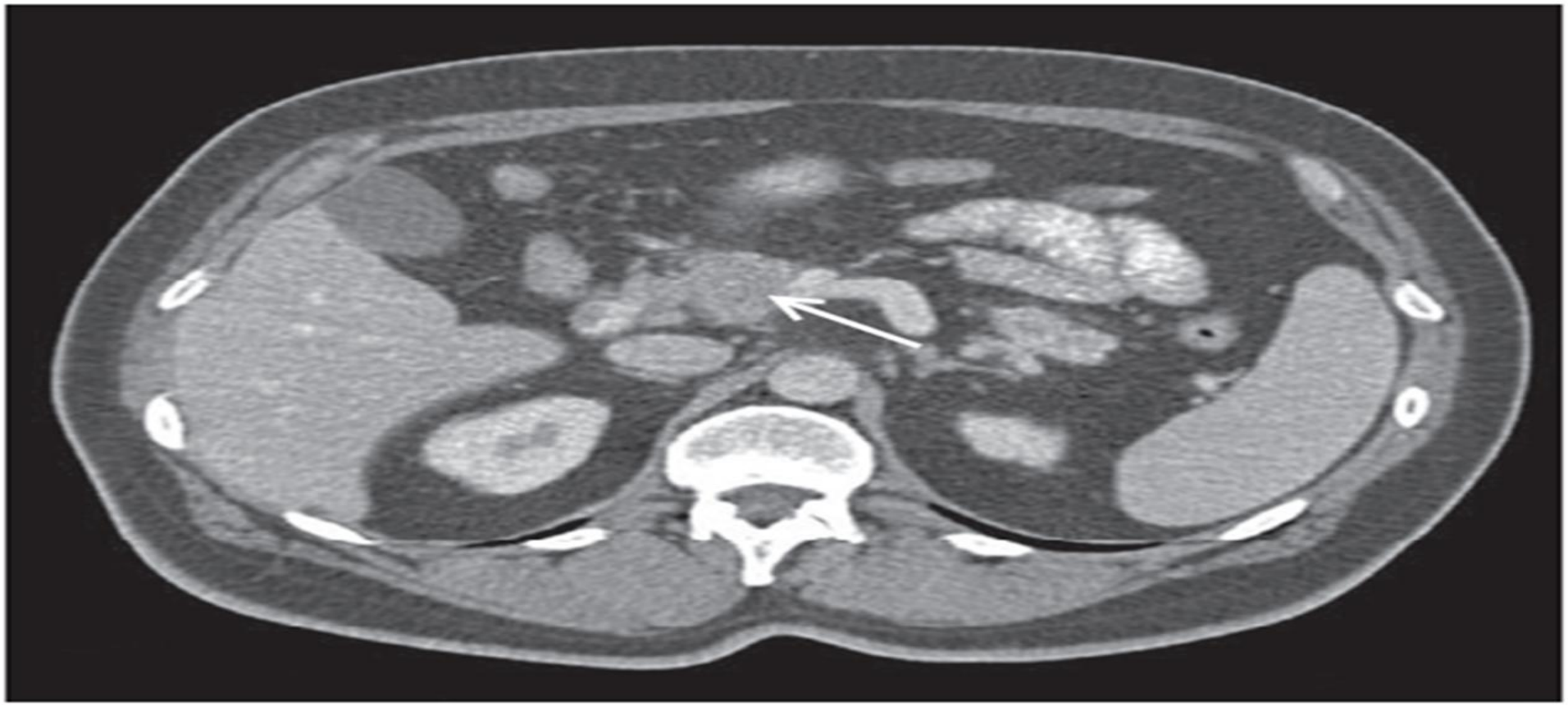
Co- Morbidities

	PD+VR n=18	Standard PD n=96
Coronary Artery disease	2(11.1%)	4(4.2%)
Diabetes	4(22.2%)	35(36.5%)
COPD	5(27.8%)	31(32.3%)
Chronic Renal insufficiency	0	1(1 %)
Hypertension	3(16.7%)	31(32.3%)
Chronic liver disease	4(22.2%)	10(10.4%)

Pancreatic head mass vascular invasion

CT scan (coronary reconstruction) showing PDAC tumor infiltration of the portal vein confluence (white circle). Superior mesenteric vein (black arrow), portal vein (broken black arrow), and splenic vein (white arrow) without thrombosis,

Head mass with PV invasion



Intra- operative data

		PD+VR n=18	Standard PD n=96
Dilated PD	>3mm	12(66.7%)	39(40.6%)
	3mm	6(33.3%)	57(59.4%)
Texture of Pancreas	soft	8(44.5%)	61(63.5%)
	Firm	10(55.5%)	35(36.5%)
Type of PD	classic	3(16.7%)	69(71.9%)
	PPPD	15(83.3%)	27(28.1%)
Type of Pancreatic-enteric anastomosis	PG	0	14(14.6%)
	PJ(Dunking)	0	16(16.7%)
	PJ(End to side)	0	39(40.6%)
	PJ(Duct to Mucosa)	16(88.9%)	23(24%)
	Closure of PD	0	2(2.1%)
	Total Pancreatectomy	2(11.1%)	2(2.1%)

Intra- operative data con.

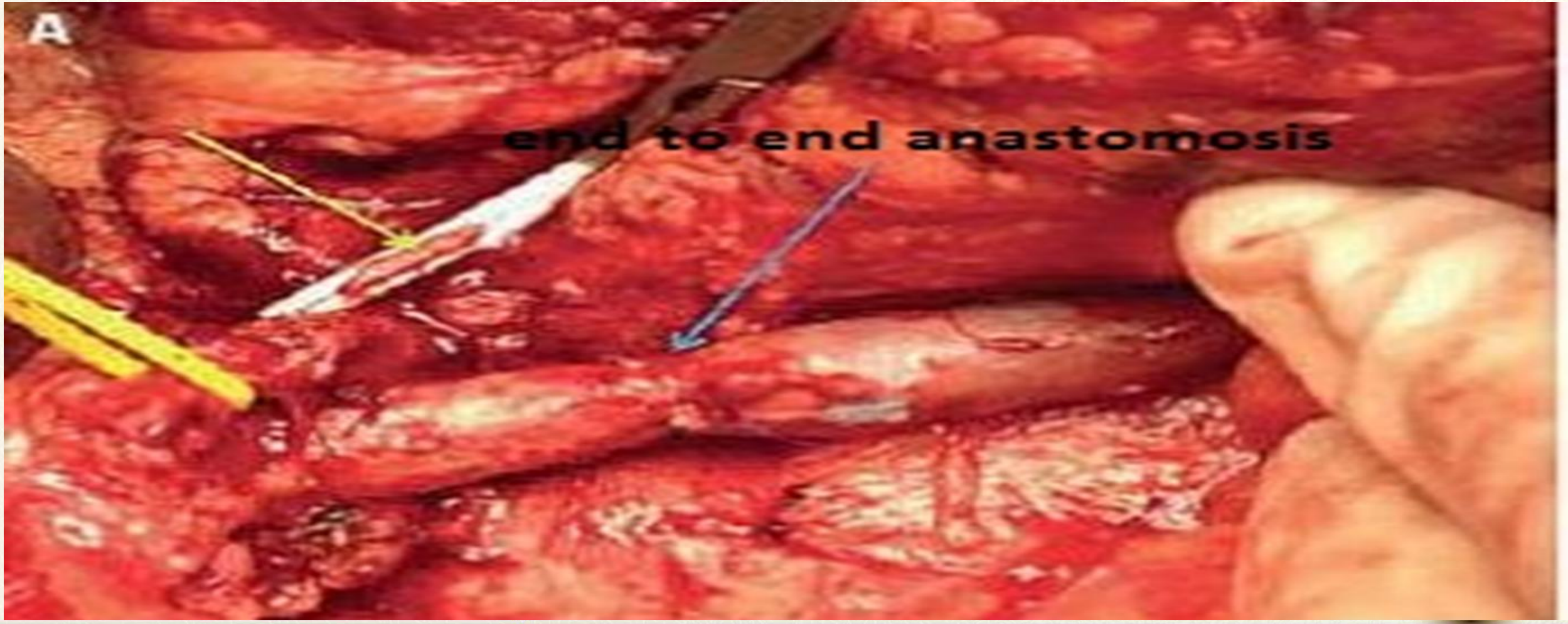
		PD+VR n=18	Standard PD n=96
Pancreatic duct stent	Yes	3(16.7%)	32(33.3%)
	No	15(83.3%)	64(66.7%)
Operative time	Range	4-8	4-10 hours
	Mean ± SD	6.1±1.6	6.95±1.4
Blood loss	Range	350-1300	200-3000
	Mean ± SD	581.25±308.1	948.8±526.6
Blood transfusion	Yes	4(22.2%)	67(69.8%)
	No	14(77.8%)	29(30.2%)

Pathological data

		PD+VR n=18	Standard PD n=96
Type of tumor	Malignant	18(100%)	85(88.5%)
	Benign	0	11(11.5%)
Origin of the tumor	Pancreatic	8(44.4%)	62(63.5%)
	Ampullary	4(22.3%)	25(26%)
	Lower CBD	0	5(5.2%)
	Duodenal	6(33.3%)	5(5.2%)
LN involvement	Yes	10(55.6%)	38(39.6%)
	No	8(44.4%)	58(60.4%)
Vascular invasion	Yes	7(38.8%)	6(6.3%)
	No	11(61.2%)	90(93.8%)
Surgical margins	Invaded	3(16.6%)	12(12.5%)
	Free	15(83.4%)	84(87.5%)

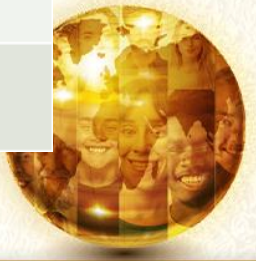
Portal vein resection

PV resection with direct end-to-end anastomosis



Postoperative morbidity

	No of patients 114 (%)
Pancreatic leakage	10(8.8%)
Bile leakage	7 (6.1%)
Delayed gastric emptying	10(9.6%)
Bleeding	9(7.9%)
Wound infection	27(23.7%)
Wound dehiscence	7(6.1%)
Reoperation	7(6.1%)

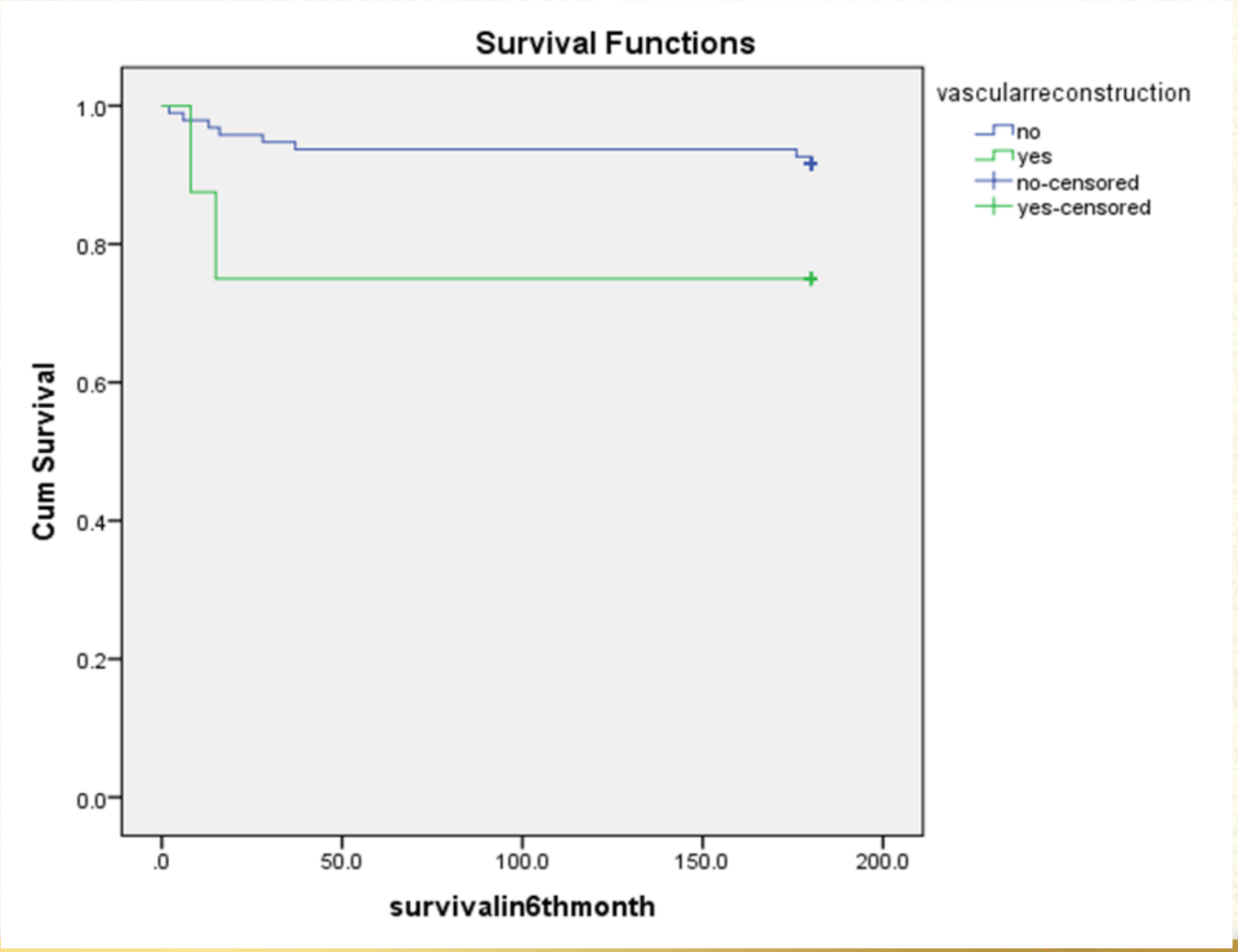


Univariate analysis of vascular reconstruction and the incidence of postoperative complications

	PD+VR n=18	Standard PD n=96	P –value
Pancreatic leakage	1(5.5%)	9(9.3%)	0.661
Bile leakage	2(11.1%)	5(5.2%)	0.139
Delayed gastric emptying	0	10(10.4%)	0.339
Bleeding	0	9(9.3%)	0.472
Wound infection	3(16.6%)	24(25%)	0.506
Wound dehiscence	0	7(7.3%)	0.561
Reoperation	1(5.5%)	6(6.2%)	0.389

Survival analysis (Kaplan-Meier curve)

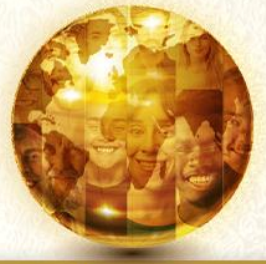
- There is no statistically significant difference between the postoperative 6 month's survival in patients with vascular reconstruction and those without vascular reconstruction (P value = 0.098).



The roles of the surgical nurse

- **Surgical nurses are** skilled in preparing patients for surgical procedures and caring for them after surgery.
- They need to have a good theoretical knowledge of the following:
  - Anatomy and physiology
  - Complications associated with surgical procedures
  - Asepsis and infection control
  - Pharmacology, including pain management
  - Anxiety and coping mechanisms
  - Patient education
  - Discharge planning.

Take Home Message



- Early detection and prevention of periampullary tumors are major rules in health programs to improve the life style of the population.

- Perioperative mortality, readmission rates, length of stay, and overall complication rates does not significantly differ between standard PD and PD with VR.

- High volume centers and surgeons together with good perioperative care are the mainstays to improve the outcome after standard PD and PD with VR.


Thank You