

A Study of Variations in Arterial Supply of Human Pancreas

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Abstract: Presence of arterial variations may result in erroneous interpretation of angiograms, the topographical anatomy of such variation is important for interventional radiologists performing arteriographs. Arterial anatomy is essential to locate the blood vessel in treatment and surgeries of various conditions. Viz. Arterial infusion,¹ chemotherapy for pancreatic cancer via superselective embolisation, Stem cell infusion² in interventional therapy of Diabetes. 50 human specimens were dissected. Origin of inferior pancreaticoduodenal artery, incidence of pre-pancreatic arcade, number of anterior pancreaticoduodenal arcade, anastomoses of transvers pancreatic artery were noted.

Keywords: Angiograms, Arterial, Pancreas, Stem cell, Variations

1. Introduction

Study of blood vessels helps not only anatomists, also radiologists to interpret or perform various radiological techniques and specially transplantation surgeons to operate on particular region. Causes for variations are due to differences in genetic, haemodynamic, race, evolutionary pattern and ontogenic development. In recent times, the trend in surgical procedure is to move towards minimal invasive surgery for reasons to reduce morbidity and mortality, if the patient is selected carefully and investigated properly. Knowledge of variations during surgery gives surgeons a sense of security.

Presence of arterial variations may result in erroneous interpretation of angiograms, the topographical anatomy of such variation is important for interventional radiologists performing arteriographs. Incidence of Diabetes Mellitus is increasing worldwide, reason being either insulin resistance or insulin deficiency. Complications of it are innumerable. Pancreas, meaning whole flesh, is the hermit of abdomen, is unpaired and retroperitoneal organ. Pancreas is richly supplied with blood by its weight and is unique in having dual blood supply by coeliac trunk and superior mesenteric artery, dual location, head body being retroperitoneal and tail intraperitoneal.

Arterial anatomy is essential to locate the blood vessel in treatment and surgeries of various conditions. Viz. Arterial infusion,¹ chemotherapy for pancreatic cancer via superselective embolisation, Stem cell infusion² in interventional therapy of Diabetes.

2. Materials and Methods

The blood supply of pancreas was studied in 50 human specimens out of which 40 were from JSS Medical College Mysore and 10 were from DM-WIMS Meppadi, Kerala.

The specimen were dissected, the stomach structures were cleaned, ligated at the pyloric end of stomach, porta hepatis and at the end of 3rd part of duodenum. Pancreas was removed along with spleen and duodenum. After 24 hours, dissected, painted and allowed to dry. The specimen numbered and photographed.

3. Observation and Results

Table 1: Origin of Inferior Pancreaticoduodenal Artery

Sl. No.	Origin	No. of Specimen	Percent
1	Superior Mesenteric Artery	49	98%
2	Common Hepatic Artery	01	02%

Table 2: Incidence of Pre-Pancreatic Arcade

Sl. No.	Incidence	No. of Specimen	Percent
1	Present	02	04%
2	Absent	48	96%

Table 3: Number of Anterior Pancreaticoduodenal Arcade

Sl. No.	Presence	No. of Specimen	Percent
1	Yes	01	02%
2	No	49	98%

Table 4: Anastomoses of Transvers Pancreatic Artery

Sl. No.	Anastomoses with	No. of Specimen	Percent
1	INFERIOR PANCREATICO DUODENAL ARTERY	49	98%
2	1st JEJUNAL ARTERY	01	02%

4. Discussion

The study data when compared to the other studies the following differences and similarities were found which is presented in the form of tables given below.

Table 5: Origin Of Inferior Pancreaticoduodenal Artery Compared With Other Studies

Sl. No.	Author	Superior Mesenteric Artery %	Common Hepatic Artery %	Jejunal Artery %	Accessory Right Hepatic Artery %	Dorsal Pancreatic Artery %
1	R.T. Woodburne & Oslen 1951 ³	97	-	-	-	-
2	Ziegler – 1942 ⁴	50	-	-	-	-
3	Falcon and Griffith – 1950 ⁵	37	-	-	-	-
4	Shyamasundar Sabot, Edgar underwood – 2011 ⁶	-	-	-	4	-
5	Skandalaki's – 2004 ⁷	-	-	2	1	6 to 8
6	Sharpios Robillard – 1946 ⁸	-	-	20	-	-
7	Rohini Motwani and Poojejunal artery Jejunal arteryin – 2013 ⁹	1 case	-	-	-	-
8	Present – 2014	98	2	-	-	-

Table 6: Incidence of Prepancreatic Arcade Compared with other Studies

Sl. No.	Author	Year	%
1	Falcon and Griffith ⁵	1950	40
2	R.T. Woodburne & Oslen ³	1951	93
3	Skandalaki's	2004	75 to 93
4	Present	2013	2

Table 7: Number of Anterior Pancreatico Duodenal Arcade Compared with other Studies

SL.NO.	Author	Number
1	Ranjeta Handsdac et al 2011 ¹⁰	Absent
2	Rohini Motwani and Pooja Jain – 2013 ⁹	1
3	R.T. Woodburn – 1951 ³	1
4	Sulochana T. Shivakami 2012 ¹¹	2
5	Present – 2013	2

Table 8: Arteries Suppling Different Parts Of The Pancreas Compared With Other Studies

S. No.	Author	Superior part of Head	Inferior part of Head	Body, Neck and Tail
1	Zhi – xian et al – 2011 ¹²	-	-	DORSAL PANCREATIC ARTERY (50%) DORSAL PANCREATIC ARTERY & , Pancreatica magna (21.6%) Transverse pancreatic artery (10.8%)
2	Yusuke sahuhar – 2008 ¹³	GDA 100%	SUPERIOR MESENTERIC ARTERY (60%) & SUPERIOR MESENTERIC ARTERY & GDA (7%)	SA (100%)
3	firoyoki Furukaea et al 1991 ¹⁴	GDA 100%	SUPERIOR MESENTERIC ARTERY 100%	
4	Present study - 2013	GDA 100%	SUPERIOR MESENTERIC ARTERY 100%	Splenic artery (100%) DORSAL PANCREATIC ARTERY, Pancreatica magna & Transverse pancreatic artery (40%) & DORSAL PANCREATIC ARTERY (2%)

5. Conclusion

During preoperative study, a detailed observation of blood supply is needed. It enables surgeons for easy and safer approach of the organ. It helps to prevent ligation of wrong vessels leading to gangrene. In mobilization of pancreas as bleeding is a complication and it can be prevented by knowing the arterial variations. Significance of arterial variation was observed in complex surgeries approaching the tail of the pancreas. Knowledge of Variations helps radiologists to interpret the radiograph accurately and helps interventional radiologists in intra – arterial infusion chemotherapy², in unresectable pancreatic cancer. In this era of stem cell therapy, intra arterial infusion of stem cells³ into the pancreas is a mode of treatment in Diabetes mellitus. The present work was undertaken wherein the detailed study of the arterial supply and its variations lends a helping hand to the transplantation surgeons, interventional radiologists. The study has a great significance in clinical and surgical aspect. It also has a very good future prospect. The study can be continued in different regions of the world and the data can be compared to know the variations present in their local population to be helpful to the surgeons. Based on the present study easier ways of stem cell infusion can be found.

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