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Original Research Article

PREVALENCE OF PATENCY OF ACCESSORY PANCREATIC DUCT AT MINOR PAPILLA IN SOUTH INDIAN POPULATION: A CADAVERIC STUDY

M. Pairoja Sultana [1], Jyothi Jatthavath *[2], C.K. Lakshmidevi [3].

[1] Assistant professor in Anatomy, ACSR Govt. medical college, Nellore, Andhra Pradesh, India.

*[2] Assistant professor in Anatomy, RIMS, Ongole, Andhra Pradesh, India.

[3] Professor and Head of the Department of Anatomy, ACSR Govt. Medical College, Nellore, Andhra Pradesh, India.

ABSTRACT

The accessory pancreatic duct is the smaller and less constant pancreatic duct in comparison with the main pancreatic duct. We investigated the patency of the accessory pancreatic duct and its role in pancreatic pathophysiology. The present study was carried out in the department of Anatomy and forensic medicine, ACSR Govt. medical college, Nellore, Andhra Pradesh, India and in the department of Anatomy, RIMS, Ongole, Andhra Pradesh, India. With 96 human cadavers (64 males and 32 females) with 30 to 80 years age group have been studied after obtained of ethical committee permission. The dissection method was followed to obtain specimen of pancreas along with C-loop of duodenum, papillae were identified ad dye was injected into APD to see its patency at MIP. 93.75% specimens present MIP. The prevalence of patency of APD at MIP in population under study was 38.89%; this is more in males was 43.33%, when compared to the females was 30% but this difference was not significant statistically. It observed that out of 35 patent APD cases, 33 cases had inter papillary distance either 2cm or more than 2cm. I t indicates 94.29% of patent APD cases had inter-papillary distance e"2cm. So there is strong relationship between APD patency and inter papillary distance in population under study. The means inter-papillary distance in patent APD cases was 2.29 ± 0.2cm and non-patent APD cases was 1.85 ± 0.25 cm. This difference was statistically significant.

KEY WORDS: Accessory Pancreatic Duct (APD), endoscopic retrograde pancreatography (ERCP), minor duodenal papilla (MIP), Cadaveric Study.

Address for Correspondence: Dr. Jyothi Jatthavath, Assistant professor in Anatomy, RIMS, Ongole, Andhra Pradesh, India. **E-Mail:** drjyothibalu@gmail.com

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INTRODUCTION

Johann Georg Wirsung In 1642 discovered the pancreatic duct, which received its name for first time in 1685, honored by Van Horne. On the other hand, the documentation of the accessory pancreatic duct has been attributed in an academic field to Giovanni Domenico Santorini, because of his observations in 1742 of major and minor duodenal papillae in association with the pancreatic ducts. Other significant findings were realized by Bidloo, who in 1685 provided the first description of duodenal papillae, biliaropancreatic union and biliaropancreatic ampulla. Also, in 1720 Vater rewrote and defined the concept of biliaropancreatic ampulla, receiving its present name. Then, in 1887 Oddi described its sphincter, determining the biliaropancreatic Ampulla complex. This complex was

the element which Opie used as the anatomic baseline for the common canal theory of acute pancreatitis, proposed in 1901 [1]. After that, the concept of exocrine pancreatic system and related structures started to have importance, taking precedent descriptions as a base to understanding the pancreatic ducts physiology. The incorporation of that knowledge permitted the elaboration of diagnostic and therapeutically procedures orientated to surgical access to the pancreatic ductal system. The description in the 17th century, authors focused on one characteristic of a specific portion of the biliaropancreatic system without making an integral relation to the regional anatomy. This entails that the documented information about variables were focused on different groups with varied characteristics. In consequence, the results are discordant to unify global knowledge, and it is necessary to elaborate a statistical work including anatomical aspects about the pancreatic ductal system of a representative group [1].

The pancreas develops embryologically from the fusion of the dorsal and ventral buds. The accessory pancreatic duct (APD) is the main drainage duct of the dorsal pancreatic bud in the embryo, entering the duodenum at the minor duodenal papilla (MIP). As development progresses, the duct of the dorsal bud undergoes varying degree of atrophy at the duodenal end, resulting the adult duct configuration [2]. The anatomical aberrations in the duct system of pancreas have clinical importance because they can predispose to various clinical disorders including pancreatitis and carcinogenesis. Aging also causes increase in the diameter of pancreatic duct. Pancreas divisum is a common anatomical variation, in which the dorsal and ventral pancreatic ducts do not unite leading to inadequate pancreatic juice drainage resulting in pancreatitis [3].

A patent accessory pancreatic duct may prevent acute pancreatitis by lowering the pressure in the main pancreatic duct. In cases of pancreaticobilliary maljunction with a patent accessory pancreatic duct, the incidence of carcinogenesis of the bile duct might be lower, as the reflux of the pancreatic juice to the bile duct might be reduced by the flow of the pancreatic juice into the duodenum through the accessory pancreatic duct. Patency of the APD, that is, patent communication between the orifice of the minor duodenal papilla and the APD has been assessed by direct injection of material into the pancreatic duct in resected or postmortem specimens [4-6]. However, the relationship between the patency of the APD and its course and shape has not previously been examined. In this study, we evaluated the patency of the APD by dye-injection endoscopic retrograde pancreatography (ERP) [7,8], and correlated it with the course and shape of the duct. The accessory pancreatic duct is the smaller and less constant pancreatic duct in comparison with the main pancreatic duct. We investigated the prevalence of patency of the accessory pancreatic duct at minor papillary in south Indian population in cadavers.

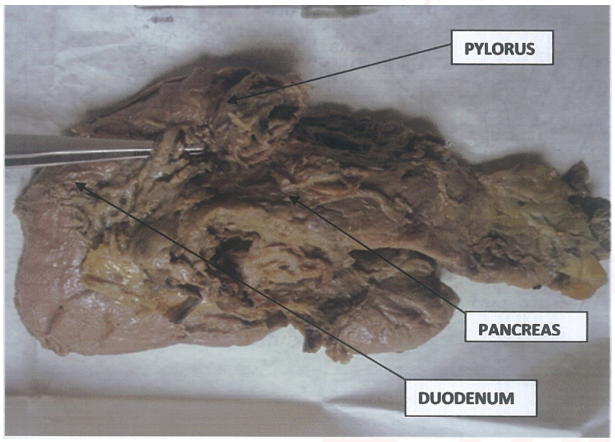
MATERIALS AND METHODS

The present study title with "Prevalence of Patency of Accessory Pancreatic Duct at Minor Papilla in south Indian Population: A Cadaveric Study" was done in the department of Anatomy and forensic medicine, ACSR Govt. medical college, Nellore, and in the department of Anatomy, RIMS, Ongole, A.P. with 96 Cadaver specimens of pancreas along with the c-loop duodenum. Cases of septicaemia, surgery in the pancreaticobilliary region and duodenal or peptic ulcer were excluded from the study. All the cadavers and medico legal cases were belongs to 30 to 80 years age group and sexes had been included. The duodenum was opened along the converse border. The specimen was fixed by keeping in 10% formalin for 3 days and then washed and fixed on wooden board with paper pins. The main pancreatic duct and accessory pancreatic ducts along were dissected. A 16 gauge needle was passed down through cut end of the common bile duct and eosin was injected. Appearance of dye in duodenum helped us to locate the major duodenal papilla. Minor duodenal papilla was also visualized similarly through injection in the accessory pancreatic duct. We performed precise measurements of its distance between the duodenal papillae. Distance between papillae was measured in cm.

Statistical Analysis: All values obtained will be expressed as Mean (± SEM). Unpaired two-tailed student t-test will be performed to

compare the difference in the means between the groups. A 'P' value <0.05 will be considered as statistically significant. Statistical Analysis will be done by using Microsoft excel spread sheets. The incidences of various parameters in the present study were expressed as percentages and chi square analysis was performed for observing the significance of difference among groups. The statistical analysis was performed using SPSS software 11.5 VERSION.

Fig. 1: C-Loop duodenum along with the pancreas.



RESULTS

Table 1: Showing the number of cadavers included in the study and Gender distribution.

Gender	Cases	
	Number	%
Male	64	66.67
Female	32	33.33
Total	96	100

Table 2: Showing the Prevalence of MIP in specimens.

Gender	MIP			
	Present	%	Absent	%
Male	60	93.75	4	6.25
Female	30	93.75	2	6.25
Total	90	93.75	6	6.25

Table 3: Showing Patency of Accessory Pancreatic Duct at MIP Present.

Sex	No. of cases	Patency of APD at MIP present	Percentage	Chi-square test	p-value
Male	60	26	43.33	1.496	0.221
Female	30	9	30		
Total	90	35	38.89		

Table 4: Showing Relation of Inter Papillary Distance with Patency of APD.

No. of cases	Inter papillary distance ≥2cm	Inter papillary distance < 2cm	% of cases with inter papillary distance ≥2cm	Chi-square test significant
Patent APD	33	2	94.29	0.0001
Non patent APD	7	48	12.73	
Total	40	50	44.44	

Table 5: Showing Mean Inter Papillary Distance in Patent and Non Patent of APD.

Sex	No. of patent APD cases	No. of Non-patent APD cases	Mean inter-papillary distance Mean ± SD		t-test
			In patent APD cases	In non-patent APD cases	
Male	26	34	2.3 ± 0.22	1.85 ± 0.40	<0.05
Female	9	21	2.28 ± 0.16	1.82 ± 0.57	<0.05
Total	35	55	2.29 ± 0.2	1.85 ± 0.25	<0.05

DISCUSSION

The present study title with "Prevalence of Patency of Accessory Pancreatic Duct at Minor Papilla in south Indian Population: A Cadaveric Study" was done in the department of Anatomy and forensic medicine, ACSR Govt. Medical college, Nellore, and in the department of Anatomy, RIMS, Ongole, Andhra Pradesh, with 96 Cadaver specimens of pancreas along with the duodenum. All the cadavers were belongs to 30 to 80 years age, in which 64 (66.67%) belongs to Male; and 32 (33.33%) belongs to Female Gender.

The minor papilla is small sub mucosal mound in the appropriate location, generally located 2 cm cranial and slightly anterior or cephalad (anterior and superior) to the major papilla. Its size is quite variable and even locating it can be difficult. A swelling or exaggeration of the minor papilla sub mucosal prominence and can aid in identification [9]. It is smaller and less easily identified than is the major papilla. The most useful landmark is the gastroduodenal artery, under which lie the accessory duct and the minor papilla. Duodenal dissection for gastrectomy should end proximal to the artery [10].

In the present study Out of 96 specimens 93.75 % (90) of total specimens were visualized Minor duodenal papilla, 93.75% (60) in Male, and 93.75% (30) in Female. In all specimens the MIP was located cranial to the MAP. IN 86 specimens MIP was cranio-Ventral to MAP whereas in 4 cases MIP was only cranial to the MAP. In all cases i.e.96 specimens, the major duodenal papilla was present. In no instances, more than two papillae were found. Since MIP present in 90 specimens, so the distance of MIP from Pylorus, intra-papillary distance (distance between MAP and MIP) were studied in the 90 cadaver specimens. Similar findings were of Sulochana S et.al [11] out of 100 cadavers 90 male and 10 female, MAP present in all and MIP

in 94%. Arora et al [3] 30 human cadavers (20male and 10 female) 76.67% and in the Baldwin et al [12] and Hand et al [13] were found MIP was present in all cases. In Kamisawa et al. [2] search he found the frequency of a patent minor papilla was 16 out of 33 (48%).

Prevalence of patency in male and female: Out of 90 cases, the patency of APD at MIP was seen in 35 (38.89%) case in total. gender wise male 26 (43.33%) and female 9 (30%) cases were seen. The difference in patent of APD at MIP between male and female was statistically not significant (p=0.221). In similar studied by the Rani A et al [14] in 2010 with 100 cadavers they found that the APD had a patent communication with duodenum in 46specimen; 30out of 60 in male and 16 out of 4 in female this is more frequent in men than females. In 2013 Lucas N.P. et al [(1)] found that APD opens in to the MIP in 28%., leads blindly into the duodenal wall in 28% and does not reach the duodenum in 6%. The author studied 50 cases obtained from cadavers. Lokadolalu Chandracharya Prasanna et al [15] in 2013 found 52.5% of the accessory ducts and 5% of the embryonic type pancreatic ducts were patent and in 42.5% of the specimen the ducts were obliterated.

The finding of prevalence of patency of APD in present study was similar to finding of Lokadolalu Chandracharya Prasanna et al (42.5%) [15], Kamisawa T et al. (43%) [2] and Tabata T et al (43%) [16] But lower than that of Ohta et al (73.33%) [17], Rani A et al (total: 46% ; male:50%, and females : 40%) [14] And Dawson W et al. (males: 49%; female: 57%) [18] and in the present study the prevalence was higher than that of Lucas N P et al. (28%) [1]. In present study males showing higher value of patency of APD as compare to female which was same as results of Rani A et al [14] but opposite to result of Dawson W et al [(18)] got higher value of patency of APD in females.

A patent APD, which act as a safety valve, may prevent complications of ERCP. The inter-papillary distance is probably the easiest parameter to access the probability of patent APD. In the present study the relationship of patency with inter-papillary distance is among the 35 specimens with patent APD, 33specimens had inter-papillary distance e”2 cm (94.29%) and in 2 specimens this distance was less than 2 cm. Among the 55 specimens in which APD was not patent, 7 specimens had inter-papillary distance e”2 cm (12.73%) and in 48 specimens this distance was less than 2 cm. When the relationship between patency of APD had inter-papillary distance e”2 cm was calculated through chi-square test showed strong significant relationship (0.0001) between patency of APD and inter papillary distance e”2 cm. The mean of inter-papillary distance in total cases of patent APD was 2.29 ± 0.2cm, where as in males 2.3 ± 0.22cm and in the females it is 2.28 ± 0.16cm. In total non patent APD was 1.85±0.25 cm, in male it is 1.85 ± 0.40 cm and in female 1.82 ± 0.57cm. in the both gender, the mean inter –papillary distance of patent APD was more than that of Non-patent APD and this difference was statistically significant.

The findings of the present study of relation between patency of APD with inter papillary distance was similar to finding of Rani A et al [14] found out 100 both sexes south Indian cadavers, 46 specimens had patent communications with duodenum at MIP. The patency of APD was more in men. The inter papillary distance varied from 1.6cm to 3.0cm, 98% of patent APD had inter papillary distance e”2 cm. But opposite to the finding of Kamisawa T et al [(2)] found that MIP was patent for APD in 90% cases when it was close to MAP (d”1.5cm), 48% cases when the inter-papillary distance range from 1.5 cm to 2.0 cm and 51% when the inter- papillary distance was more than 2.0cm. No other authors compare the relationship between patency of APD with inter-papillary distance and difference in inter-papillary distance of MIP with patent APD and MIP with non-patent APD as per present study.

CONCLUSION

In the present study all the cadavers were belongs to 30 to 80 years age, in which 64 (66.67%) belongs to Male; and 32 (33.33%) belongs to Female Gender. Map is present in all cases whereas MIP may not be visible in some cases. The average inter papillary is 2 cm without any significant difference between males and females. The APD is patent at the duodenal end in 43% male and in 30% female that means

slightly more patent in males. A chance of patency of APD was increases with increase in inter-papillary distance especially if inter-papillary distance is 2 cm or more. The constant introduction of newer and modified techniques i the diagnosis and management of the pancreatic diseases has increased the importance of detail knowledge of duodenal papillae. Thus this study may be helpful to provide some details knowledge of anatomy of duodenal papillae.

Conflicts of Interests: None

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