



Radio-Diagnosis

AN OBSERVATIONAL STUDY OF NORMAL VARIANTS OF PANCREATOBILIARY JUNCTION USING MAGNETIC RESONANCE CHOLANGIOPANCREATOGRAPHY IN THE SOUTH INDIAN POPULATION

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ABSTRACT

Magnetic Resonance Cholangiopancreatography (MRCP) is an advanced, non-invasive imaging modality that plays a crucial role in the diagnostic evaluation of pancreaticobiliary diseases. This technique leverages magnetic resonance imaging (MRI) to visualise the biliary and pancreatic ducts, providing high-contrast images essential for accurate diagnosis and treatment planning. **Methodology:** A hospital-based observational study was conducted in a tertiary care centre with a 1.5T MRI, a sample size of 60 cases referred for magnetic resonance cholangiopancreatography and normal anatomical variants of pancreaticobiliary junction were accessed and categorised either as B-P type, P-B type or V/separate opening. Results: 28.3% of participants exhibited the pancreatic type junction in the bile duct, while 40.0% showed the pancreatic duct-bile duct junction variant. Additionally, 31.7% presented the V-type junction. **Conclusion:** The findings of our study have significant implications for the field of pancreaticobiliary research and clinical practice. By documenting the prevalence and types of pancreaticobiliary junction variants, our study supports the development of tailored surgical and diagnostic approaches that consider regional and demographic differences. This tailored approach can lead to safer surgical procedures, more accurate diagnoses, and better overall patient outcomes. Our study not only corroborates existing findings but also enhances the understanding of pancreaticobiliary junction variants, paving the way for improved clinical practices and patient care in diverse populations. The detailed insights from our study contribute to the ongoing efforts to optimize diagnostic and surgical techniques, ultimately aiming to enhance patient safety and outcomes in the field of pancreaticobiliary diseases.

KEYWORDS : MRCP, MRI, Anatomical variation.

1. AIMS AND OBJECTIVES: To identify and document the anatomical variations in the pancreatic and biliary ducts using Magnetic Resonance Cholangiopancreatography (MRCP). To determine the incidence of each identified anatomical variant in the study population.

METHODOLOGY:

STUDY DESIGN: Hospital-based observational study

STUDY AREA: Department of Radio-diagnosis, Sri Venkateshwaraa Medical College Hospital and Research Centre (SVMCH&RC), a tertiary care teaching hospital located in Ariyur, Pondicherry.

TIME FRAME: Retrospective Study: February 2020 to March 2022
Prospective Study: April 2022 to October 2023. Study Population: South Indian population

SAMPLE SIZE: Retrospective sample: 40 Prospective sample: 20

SAMPLING TECHNIQUE: Purposive sampling

INCLUSION CRITERIA: Patients referred to the radiology department for MRI abdomen are included in the study.

EXCLUSION CRITERIA: Any abnormality in the 2nd or 3rd parts of the duodenum in other MRI sequences. Presence of annular pancreas.

DATA COLLECTION:

Retrospective evaluation: Anonymized images will be utilized for the retrospective part of the study. These images will be anonymized confidentially by a person or group appointed by the Institutional Ethical Committee (IEC) chairman. The anonymized images will then be provided to the principal investigator by the IEC member secretary for analysis.

Prospective Evaluation: Before undergoing MRCP, patients will be asked if they are willing to contribute data from their MRCP for the study. Consent will be obtained in the participant's mother tongue, both in written form and through oral explanation. Following this, patients will undergo their intended procedure, and the data from the images will be used for evaluation.

DATA ANALYSIS:

Data will be entered into Excel sheet and analyzed using statistical software. Descriptive statistics will summarize demographics and baseline characteristics. Chi-square tests for categorical variables and independent t-tests for continuous variables were used. A p-value < 0.05 will be considered statistically significant. Variants of the pancreaticobiliary junction were recorded and analysed.

RESULTS:

Table 1: Prevalence of Pancreatic Duct joining Bile Duct Junction P-B type.

Pancreatic duct joining bile duct P-B type	Frequency (n)	Percentage (%)
Absent	43	71.7
Present	17	28.3
Total	60	100.0

Table 2: Prevalence of Bile Duct joining Pancreatic duct B-P type.

Bile Duct joining Pancreatic Type B-P type	Frequency (n)	Percentage (%)
Absent	36	60.0
Present	24	40.0
Total	60	100.0

Table 3: Prevalence of V/ separate Opening.

V/ Separate opening	Frequency (n)	Percentage (%)
Absent	41	68.3
Present	19	31.7
Total	60	100.0

Table 4: Measurement Variability of Common Channel (CC) Distances.

Variable	Mean	Standard Deviation
CC (in mm)	4.905	3.9682

DISCUSSION:

The purpose of our study was to investigate the anatomical variations in the pancreaticobiliary junction within a South Indian population using Magnetic Resonance Cholangiopancreatography (MRCP). This research aimed to document the prevalence of these variations and analyze their clinical implications, particularly in the context of

surgical planning and diagnostic accuracy. By employing both retrospective and prospective study designs, we sought to provide a comprehensive overview of these anatomical features and their relevance to clinical practice.

Our study revealed that a significant portion of the population exhibited variations in the pancreaticobiliary junction. Specifically, we found:

AGE DISTRIBUTION: 51.7% of participants were aged 45 years or younger, 26.7% were aged 46-60, and 21.7% were aged 61 or older.

GENDER DISTRIBUTION: The study had a nearly balanced gender distribution with 51.7% males and 48.3% females.

PREVALENCE OF VARIANTS: 28.3% of participants exhibited the pancreatic type junction in the bile duct, while 40.0% showed the pancreatic duct-bile duct junction variant. Additionally, 31.7% presented the V-type junction.

CLINICAL IMPLICATIONS: The study highlighted the variability in C-C distances and the associations between these anatomical variants and demographic factors like age and gender.

In our study, the demographic profile of participants included a relatively younger cohort, with 51.7% aged 45 years or younger, 26.7% aged 46-60 years, and 21.7% aged 61 years or older. The gender distribution was nearly balanced, with 51.7% males and 48.3% females. This comprehensive demographic breakdown contrasts with many reviewed studies that lacked detailed demographic data. For instance, studies by Ze-li Yu (2004), T. Kamisawa (2006), Y. Tang (2001), and K. Uchiyama (1998) focused on anatomical findings and diagnostic accuracy without specifying age or gender distributions. Some studies, such as those by R. Bülow (2014) and Hong-Ja Kim (2002), included broader population samples but still did not provide specific demographic breakdowns, though Hong-Ja Kim's study noted a higher frequency of duct anomalies in patients over 40 years of age. – This broader age range is somewhat comparable to our study's demographic but without the granular detail we provided.

The similarities between our study and the existing literature include the inclusion of broad age ranges and a balanced gender distribution reflective of the general clinical population. However, our study's detailed demographic data offers a unique perspective, particularly focused on a South Indian population, whereas the reviewed studies varied widely in geographic and ethnic focus, including Korean, Japanese, and Chinese populations. These differences in demographic details could influence the observed prevalence and types of pancreaticobiliary variants. For example, the relatively younger cohort in our study might impact the prevalence rates compared to studies noting higher anomaly frequencies in older populations. Moreover, our balanced gender distribution ensures broad applicability and avoids gender bias, which is crucial for generalizing the clinical relevance of the anatomical variants identified.

In our study, Magnetic Resonance Cholangiopancreatography (MRCP) was the primary diagnostic technique used to identify anatomical variations in the pancreaticobiliary junction. MRCP was chosen for its non-invasive nature and its ability to provide detailed images of the biliary and pancreatic ducts. The retrospective evaluation involved anonymized MRCP images, while the prospective evaluation included MRCP scans performed with patient consent, ensuring comprehensive and accurate data collection.

Many of the reviewed studies also employed MRCP as a key diagnostic tool, often comparing its accuracy and effectiveness to Endoscopic Retrograde Cholangiopancreatography (ERCP).

CONCLUSION:

The findings of our study have significant implications for the field of pancreaticobiliary research and clinical practice. By documenting the prevalence and types of pancreaticobiliary junction variants, our study supports the development of tailored surgical and diagnostic approaches that consider regional and demographic differences. This tailored approach can lead to safer surgical procedures, more accurate diagnoses, and better overall patient outcomes.

Our study not only corroborates existing findings but also enhances the

understanding of pancreaticobiliary junction variants, paving the way for improved clinical practices and patient care in diverse populations. The detailed insights from our study contribute to the ongoing efforts to optimize diagnostic and surgical techniques, ultimately aiming to enhance patient safety and outcomes in the field of pancreaticobiliary diseases.

CLINICAL IMAGES:

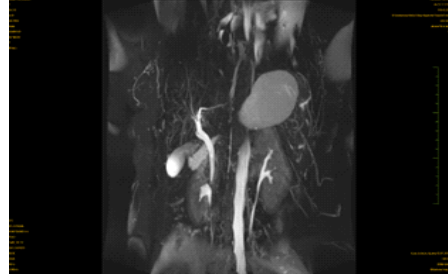


Image 1: MRCP coronal image showing the bile duct joining the pancreatic duct (B-P type)



Image 2: MRCP coronal image shows the separate opening of the bile duct and the pancreatic duct (V/separate opening)

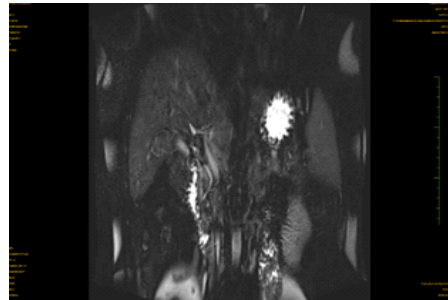


Image 3: MRCP coronal image shows the pancreatic duct joining the bile duct (P-B type).

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