International Journal of Anatomy and Research,
Int J Anat Res 2026, Vol 14(2):9490-95. ISSN 2321-4287
DOI: https://dx.doi.org/10.16965/ijar.2026.114

Original Research Article

Morphology of the Hepatopancreatic Ampulla by the Injection-radioscopy Method: Anatomical Study and Clinical Applications About 30 Cases

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ABSTRACT

Objective: the purpose of our work was to study the configuration of the hepato-pancreatic junction and to review the literature.

Material and method: It was a fundamental observational study for descriptive purposes. It was about 30 pieces of fresh pancreas taken from anatomical subjects during forensic autopsy. The average age was 39.43 years. The cephalo-isthmic configuration of the pancreatic ducts was studied by the injection-radioscopy method. The mode of constitution of the hepatopancreatic (AHP) was evaluated based on the Flati classification [1]. The parameters studied were morphological and morphometric.

Results: in 18 cases (60%), there was a "Ya" type with an average length of 5.4mm of the AHP and an average diameter of 1.6mm. In 1 case (3.3%), we observed a "Yb" type with a length of 12mm of the AHP and a diameter of 1.9mm. In 2 cases (6.7%), the AHP had the shape of a "V" with an average length of 0.95mm of the AHP and an average diameter of 0.7mm. In 8 cases (26.7%), the AHP had the shape of a "U". In 1 case (3.3%), the AHP had the form of an "II".

Conclusion: The anatomical study of the AHP in the population is interesting in the sense that it makes it possible to identify or estimate the groups at risk regarding the occurrence of certain pathologies of the bilio-pancreatic pathways.

KEYWORDS: Pancreatic Ducts, Hepato-Pancreatic Ampoule, Injection-Radioscopy, Flati Classification.

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Access this Article online	Journal Information
Quick Response code	**International Journal of Anatomy and Research** ISSN (E) 2321-4287 | ISSN (P) 2321-8967 **https://www.ijmhr.org/ijar.htm** **DOI-Prefix:** https://dx.doi.org/10.16965/ijar
DOI: 10.16965/ijar.2026.114	**Article Information** Received: 02 Feb 2026 Accepted: 07 May 2026 Peer Review: 08 Feb 2026 Published (O): 05 June 2026 Revised: 03 Mar 2026 Published (P): 05 June 2026

INTRODUCTION

The hepatopancreatic ampulla (HPA) has a complex anatomy related in particular to the different modes of convergence of the choledoc duct (CD) and the main pancreatic duct (MPD) [1-2].

Thus, there are multiple anatomical variants essential to know to prevent certain risks of pathologies of varying severity, ranging from biliary cysts to biliary tract cancers [3]. Indeed, the relationship between the terminal portions of CD and MPD and its variants has long been important in the sense that the reflux of bile, duodenal or pancreatic contents in this ductal system may or may not be possible in certain anatomical circumstances [4-6].

The objective of this study was to describe the configuration of the hepato-pancreatic junction by the radioscopy injection method and to review the literature.

MATERIALS AND METHODS

This is a fundamental observational study for descriptive purposes. It concerned 30 pieces of fresh pancreas taken from anatomical subjects during forensic autopsy (numbered from P_1 to P_{30}). The average age was 39.43 years (Type deviation=13.9). The sex ratio was 3.3. The average size of the subjects was 175.10 cm [extreme 163cm-187cm]. The average length of the pancreas was 22.48 cm +/-2.4.

In the laboratory, the transverse length of the pancreas was measured with a tape measure, from the right edge of the head from the middle of the descending portion of the duodenum to the end of the tail. Then the choledoc duct was spotted on the posterior face of the room and then catheterized with an intranulle of adapted caliber. Subsequently, the pancreas was sectioned sagittally over its entire height using a scalpel at the body-tail junction. The main pancreatic duct was spotted in the section and catheterized. Then the room was sent to the imaging department to take x-ray shots using a versatile digital radio-fluoroscopy device with a tilting table. First of all, a first shot without injection was taken. Then, the contrast agent was injected at constant pressure, under radioscopic control, into the main pancreatic duct (1st step), then into the choledoch (2nd time) and finally both at the same time (3rd time). The intra-pancreatic ducts were spotted until they were dislodged at the duodenal mucosa. When the injection was deemed sufficient, front incidence shots are taken for the different times. For each preparation, photographs were taken. The assessment of the permeability of the duodenal papillae was judged on the

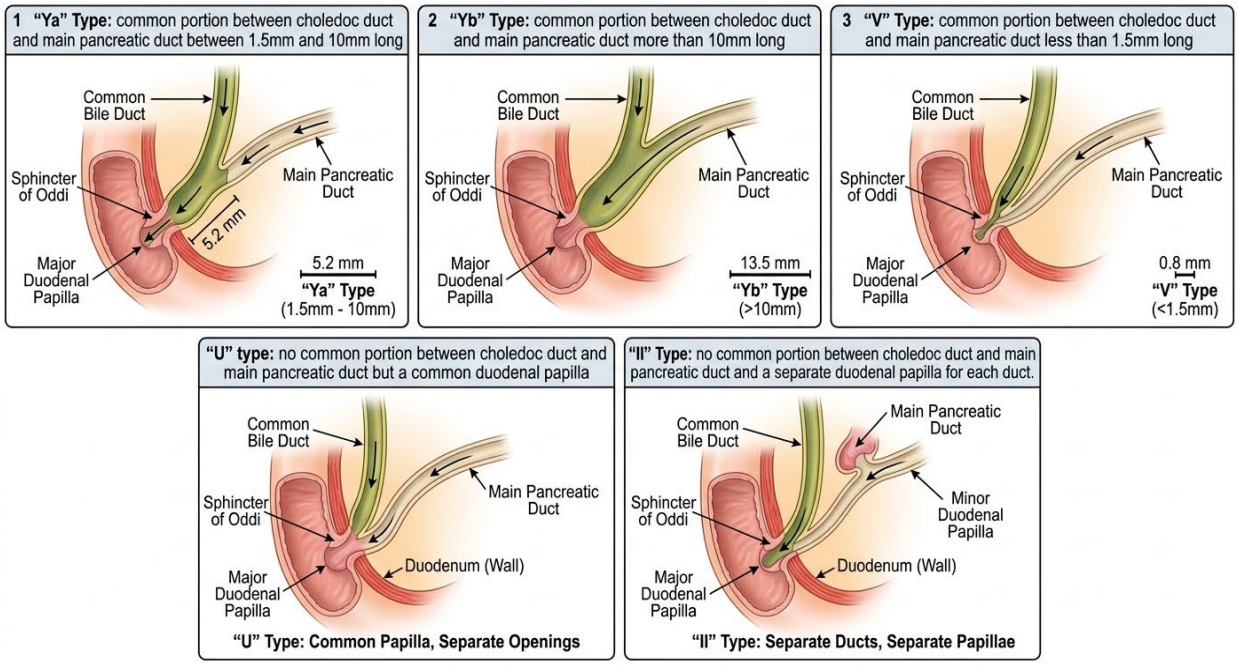

Fig. 1: Variations of the hepatopancreatic ampulla according to Flati [Flati]

1. "Ya" Type: common portion between choledoc duct and main pancreatic duct between 1.5mm and 10mm long
2. "Yb" Type: common portion between choledoc duct and main pancreatic duct more than 10mm long
3. "V" Type: common portion between choledoc duct and main pancreatic duct less than 1.5mm long
4. "U" type: no common portion between choledoc duct and main pancreatic duct but a common duodenal papilla
5. "II" Type: no common portion between choledoc duct and main pancreatic duct and a separate duodenal papilla for each duct.

injection clichés. The cephalo-isthmic configuration of pancreatic ducts was studied. The method of constitution of the hepatopancreatic ampulla was evaluated on the basis of the Flati classification (Figure 1) [1].

The actual dimensions (length and diameter of the AHP) were taken by the ruler at the PACS (Picture Archiving and Communication System).

Finally, the anatomical pieces were secondarily sent to the Anatomy and Organogenesis Laboratory.

The parameters studied were morphological and morphometric. The data have been analyzed by SPSS software version 25.0.

RESULTS

The different modalities of junction between the choledoc duct and the main pancreatic duct were mainly at the level of a hepatopancreatic ampoule but in a variable way. This hepatopancreatic bulb always opened at the level of a single major duodenal papilla.

In 18 cases (60%), a "Ya" type was noted with an average length of 5.4mm of the common portion (extremes 1.9mm-9.9mm) and an average diameter of 1.6mm (extremes 1mm-3.2mm) (Figure 2).

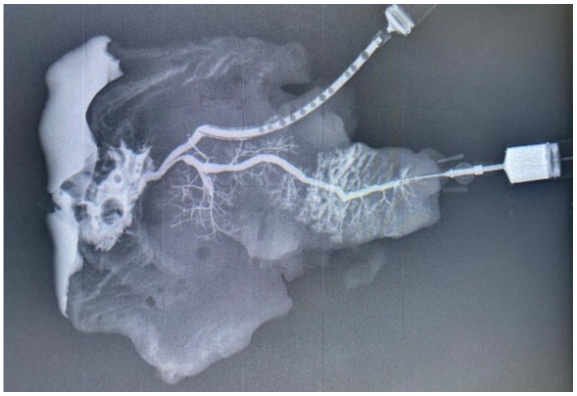

Fig. 2: Hépato-pancréatic ampulla in Ya (P_{26}).

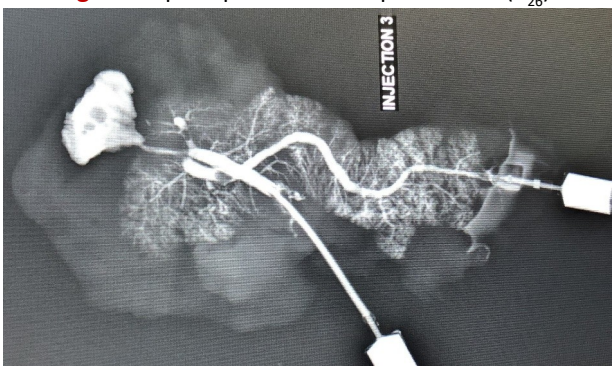

Fig. 3: Hépato-pancréatic ampulla in Yb (P_{30}).

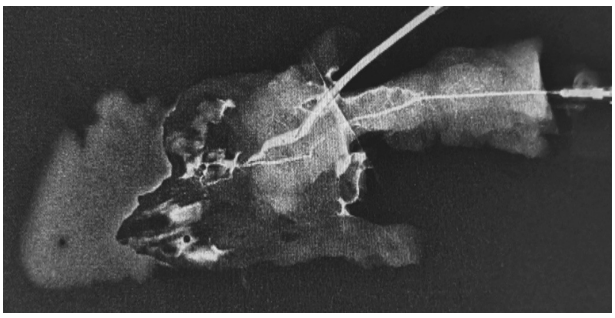

Figure 4 : Hépato-pancréatic ampulla in V (P_8)

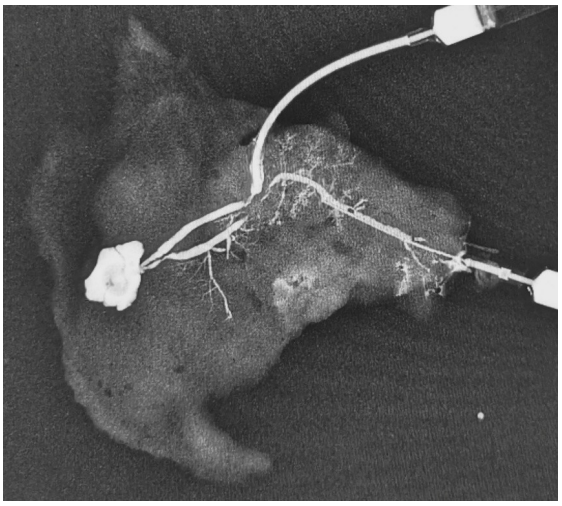

Fig. 5: Hépato-pancréatic ampulla in U (P_{19})

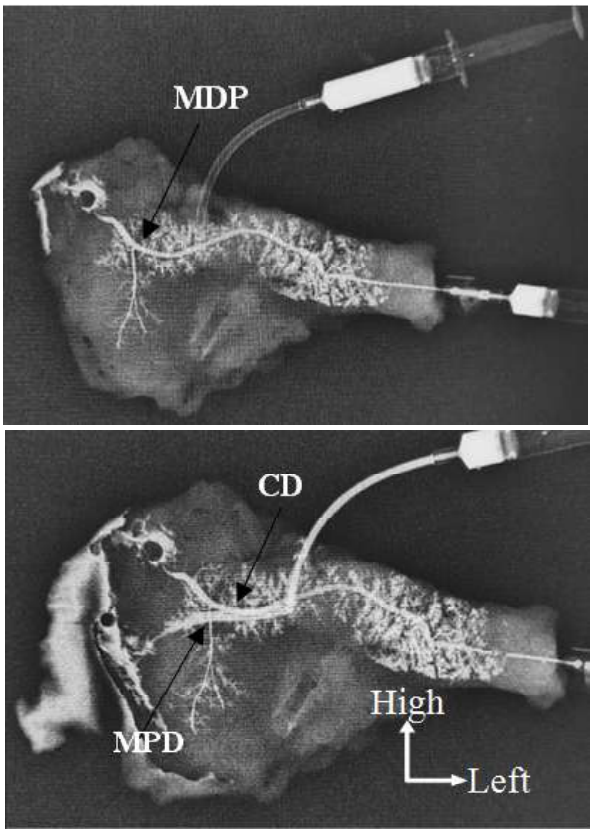

Fig. 6: Hépato-pancréatic ampulla in II (P_{10}).

In 1 case (3.3%), a "Yb" type was observed with a length of 12mm of the common portion and a diameter of 1.9mm (Figure 3).

In 2 cases (6.7%), the hepatopancreatic bulb

was shaped like a "V" with an average length of 0.95mm of the common portion and an average diameter of 0.7mm (figure 4).

In 8 cases (26.7%), the hepatopancreatic ampoule had the shape of a "U" with the main choledoc and pancreatic ducts that opened at the level of the same duodenal papilla without having a common portion (Figure 5).

In 1 case (3.3%), the hepatopancreatic ampoule had the shape of an "II" where there was no common portion between the choledocal duct and the main pancreatic duct and a distinct duodenal papilla for each duct (Figure 6).

Table I reports in detail the sample distribution according to the Flati classification according to the AHP configuration.

Table 1: Distribution of the sample according to the Flati classification.

HPA Configuration (Flati's classification)	Number of pupils	Pourcentage
Ya Type	18	60
U Type	8	26,7
V Type	2	6,7
Yb Type	1	3,3
II Type	1	3,3

DISCUSSION

The anterograde injection-radioscopy method is a means of seeing almost all the ramifications of the pancreatic ducts. This method has allowed many authors to provide new data on pancreatic ducts. It is an easily feasible exploration method, already proven for years [7-10]. Indeed, dissection makes it easy to follow the duct that drains the tail and body of the pancreas during its relatively straight path to the head of the pancreas. But it becomes much more difficult to follow the duct, to identify its tributaries and its communications once it has entered the head of the gland. Thus, the rise of endoscopic retrograde pancreatography, as a clinical procedure, has prompted some authors aftertunneling of the main choledocal and pancreatic ducts to obtain pancreatograms in post-mortem anatomical subjects. In 1911, Baldwin was already providing convincing results by an injection-radioscopy method than the pancreatic duct dissection method [11]. In addition, the anterograde injection, giving similar results, is a much more physiological test by providing more or less details of the anatomy of the pancreatic ducts.

Over the years, several classifications of pancreatic ducts have been proposed with, among others, that of Millbourn which was modified by Sigfusson, that of Dawson but it was in the 1990s that Skandalakis and Flati proposed classifications specific to the morphology of the hepatopancreatic ampoule [1,10,12,23].

We used the Flati classification because it is more recent and it has been used by several authors such as Wilasrusmee who conducted a study similar to ours in the same working conditions in Thailand [1,14].

Hepatopancreatic ampulla configuration

The observation of the different series shows that in most cases, the main pancreatic duct joins the choledoc duct to form a common portion before discarging through the same orifice in the second portion of the duodenum. This anatomical arrangement involves about more than half of the populations with a clear predominance of the "Ya" type, as we observed in our series. The percentage of the "Yb" type ranks second in literature. The latter is very important because it corresponds to subjects with a common portion between choledoc duct and pancreatic duct quite long, i.e. greater than 10 mm. However, we only noted it in 3.3% of cases, such as the Flati series (4%). Therefore, if the common portion exceeds 15 mm, it is considered pathological. Several studies including those of Schweitzer, Azahouani and Komi have shown that a long common portion was a factor in the occurrence of congenital choledochal cysts [15-17]. Other authors such as Matsubayashi and Kamisawa demonstrated that this long common portion was a high risk factor for gallbladder carcinoma [18-19]. This is explained by the reflux of pancreatic fluid in the bile ducts inducing epithelial changes (hyperplasia) associated with long-term inflammation, which eventually lead to carcinogenesis. In this regard, some authors such as Arnaud, Kamisawa and Thomas have recommended a preventive cholecystectomy against gallbladder carcinoma in the case of a

long common duct between choledocal duct and pancreatic duct [19-21]. According to Berman et al., a sufficient length of the common portion is relatively rare, occurring in 6.2% of cases [22]. In such a conduit, the reflux of bile into the duct system of the pancreas would be clearly anatomically possible if the duodenal orifice were blocked. But Dawson and Langman concluded that a common portion as short as 3 mm would make bile reflux possible [23]. A length of the common portion of 3 mm, or more, was found in about half of their cases.

It is also agreed that, in a proportion of cases, the main pancreatic duct and the bile duct are separate, although adjacent to the duodenum on the major duodenal papilla. The frequency of such cases varies from an incidence of 20 to 30% in the results of various observers. Such variations in the results obtained by the various authors clearly show that there must be many cases in which it is difficult to distinguish between a common orifice and two ducts that open separately but come closer. In the case of the latter type, the choledoc and main pancreatic ducts each end on the major duodenal papilla, having been separated by a septum until their termination. Wilasrusmee found that 10.68% of its cases were of this type [14]. Jirasiritham found that in 12.68% of their 160 dissections, there was no junction of the pancreatic and bile ducts while Flati found that in 22.4% of the 49 dissections he performed, the two ducts remained separate [24]. Thus, these investigations were mainly based on dissection. This configuration corresponds to the “U” type of the Flati classification, which ranked 2nd in our series with 8 or 26.7% of the cases.

It has been shown that between 20% and 30% of cases may have these separate biliary and pancreatic orifices on the duodenal papilla. In the Millbourn studies, [Millboum 1950], in which he used injection methods followed by radiography, it was only exceptionally (about 1 in 20 cases) that there were separate orifices.

Berman et al. found that in only 6.2% of their 130 specimens, the main pancreatic duct and the choledoc ducts opened independently in the duodenum [22]. This configuration corresponds to type “II” of the Flati classification. We observed that in a single case is 3.3%.

CONCLUSION

The anatomical study of the hepatopancreatic ampoule in the population is interesting in the sense that it makes it possible to identify or estimate risk groups for the occurrence of certain pathologies of the bilio-pancreatic pathways. These anatomical data have important clinical applications and open up new surgical perspectives, including the prevention of the occurrence of cysts or biliary tract cancer. This prevention is based on the early detection of the anatomical variants of the hepatopancreatic ampoule.

Conflicts of Interests: **None**

Ethics Committee Approval : approved

Author Contributions

all authors conbributed to the writting and profreading of this manuscript

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How to cite this article: Ndiaye M, Ndoye N J-M, Ndiaye Aï, Thiam I, Dial Cmm, Kasse M, Deme H, Ndiaye Ab. Morphology of the Hepatopancreatic Ampulla by the Injection-Radioscopy Method: Anatomical Study and Clinical Applications About 30 Cases. Int J Anat Res 2026;14(2):9490-9495. **DOI:** 10.16965/ijar.2026.114