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Intraoperative Variations of the Gastrocolic Trunk of Henle noted in Gastrointestinal Surgeries

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ABSTRACT

Background: The gastro-colic trunk of Henle is a venous trunk that comprises the veins draining the stomach and colon and is an important landmark for various gastro-intestinal surgeries. Understanding the anatomy of these vessels may enhance the surgical outcome. The aim of this study is, to assess the Intraoperative variations of the Gastrocolic Trunk of Henle noted in gastrointestinal surgeries in a tertiary care center.

Methods: A descriptive cross-sectional study was conducted at Kathmandu Medical College Public Limited, a tertiary center in Nepal during the period of one year (1st January 2022, to 31st December 2022). All patients undergoing right hemicolectomy, gastrectomy, and pancreaticoduodenectomy were included in the study. Based on per-operative findings, the type of The gastro-colic trunk of Henle was noted during surgery.

Results: A total of 49 patients underwent the above-mentioned surgeries during the study period. The gastro-colic trunk was found in 45 out of the 49 patients intraoperatively (91.84%), and the variations were distinguished. The most common configuration noted was the union of the right gastro-epiploic vein, the anterior superior pancreaticoduodenal vein, and the superior right colic vein (Type I), which was noticed in 46.67% of the patients.

Conclusions: The intraoperative identification of the anatomy of The gastro-colic trunk of Henle is challenging because of its variable combinations of tributaries. Knowledge of variations in The gastro-colic trunk of Henle is important in preventing intraoperative bleeding, and during identification, the meticulousness of surgery is redefined.

Keywords: Gastrocolic trunk of Henle; hemicolectomy; venous drainage.

INTRODUCTION

Traction at and around the root of the transverse mesocolon and pancreas are causes of venous bleeding. Different vessels of Henle's gastrocolic trunk are important landmarks, first described by Henle in 1868.[1] This venous trunk connects the blood supply to the stomach and colon drained by right gastro-epiploic vein (RGEV) and superior right colic vein (SRCV) respectively and then drains into the superior mesenteric vein at inferior border of the pancreas. Descomps et al. added the anterior superior pancreaticoduodenal vein (ASPDV), thus completing the definition of the trunk. The anatomy of the veins has been mentioned but not described in context with right hemicolectomy.[2] Studies have described the characteristics of this trunk's length, caliber, and topography using autopsy, preoperative computed tomography and intraoperative anatomy providing new insight into the construction and variation.[3-6] This study aims to record the intraoperative variation of the trunk during open GI surgeries.

METHODS

A hospital based descriptive study was conducted at Department of Surgery, Kathmandu Medical College Public Limited, a tertiary care centre located in Kathmandu, Nepal from 1st January 2022 to 31st December 2022. Ethical clearance was obtained from the Kathmandu Medical College-Institutional Review Committee (Ethical approval Registration Number.: 1201202104). Written consent was obtained from the patients who were included in the study. A

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total of 49 patients who underwent right colectomy, pancreaticoduodenectomy, and gastrectomy during the study period were enrolled in the study. The patients undergoing laparoscopic surgeries were excluded from the study. A census sampling method was used.

The socio-demographic variables included were age and gender where gender was categorized as male and female. The same group of surgeons (two consultants) performed the surgery in the department. Intraoperative and postoperative photographs were taken and evaluated by another experienced surgeon of a different unit for internal validation. Variation of Gastrocolic trunk noted and recorded. Variations in the union among the right gastro-epiploic vein (RGEV), anterior superior pancreaticoduodenal vein (ASPDV), superior right colic vein (SRCV), Right Colic Vein (RCV) and Middle colic Vein (MCV) were noted. The collected data were stored in Microsoft excel and the results were analyzed using statistical package for social sciences (SPSS).

RESULTS

Among the 49 patients who underwent the above-mentioned surgeries, 59.18% were male and 40.82% were female (Table 1).

Table 1. Socio demographic Characteristics and Procedures in Patients.

Variables	Frequency (n %)
Male	29 (59.18%)
Female	20 (40.82%)
Age (mean ± SD)	54 ± 3 years
Procedures	
Pancreaticoduodenectomy	29 (59.18%)
Right hemicolectomy	10 (20.4%)
Subtotal gastrectomy	10 (20.4%)

Of the total, 59.18% of patients underwent pancreaticoduodenectomy procedure, 20.4% went through right hemicolectomy and remaining 20.4% had subtotal gastrectomy. Four patients were excluded from the study because of an inadequate assessment of GCTH. Due to dense adhesion and inadequate hemorrhage assessment, these four cases which were uncinate process masses of the pancreas, were excluded from the study.

The gastro-colic trunk was found in 45 out of the 49 patients intraoperatively (91.84%). The most common configuration noted was Type I, which was discovered in 21 (46.67%) patients. Similarly, 12 (26.67%) of the patients had Type 0 variation, 11 (24.45%) had Type II and only one (2.23%) had Type III variation (Table 2).

Table 2. Variations of GCT and their Frequency.

Variations of gastro-colic trunk	n	Percentage
Type 0 (RGEV + ASPDV)	12	26.67
Type I (RGEV + ASPDV + SRCV)	21	46.67
Type II (RGEV + ASPDV + SRCV + RCV)	11	24.45
Type III (RGEV + ASPDV + SRCV + RCV + MCV)	1	2.23

The intraoperative images identifying GCTH were captured during the surgery (Figure 1).

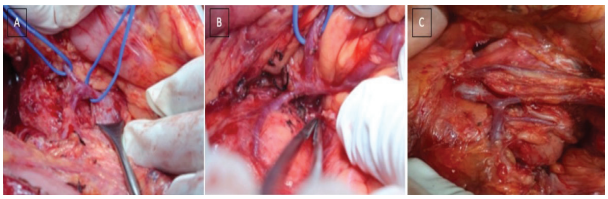

Figure 1. a) Clinical picture with Type 0 showing the union of right gastro-epiploic vein and anterior superior pancreaticoduodenal vein, b) Type I GCTH showing the union among the right gastro-epiploic vein, anterior superior pancreaticoduodenal vein and superior right colic vein, c) Type III GCTH with the union of the right gastro-epiploic vein, anterior superior pancreaticoduodenal vein, superior right colic vein and right colic vein.

DISCUSSION

The gastro-colic trunk of Henle, which connects the stomach and colon-draining veins, is an important landmark during GI surgeries. The prevalence of gastro-colic trunk in our study is 91.84%, similar to various studies.[3,8,9] The gastro-colic trunk of Henle is subjected to various degrees of variation and has been classified differently in the literature. We categorized our series in accordance with Miyazawa et al.'s classification.[7]

While Jin et al. presented results that were comparable to those of Miyazawa et al. using the same classification in cadavers, Miyazawa et al. described the variations and classified them using the preoperative three-dimensional

(3D) multidetector-row computed tomography (MD-CT) technique.[6,7] Our series is one of the first to describe and classify the GCTH intraoperatively in real time.

The most common variation of GCT was Type I (RGEV + ASPDV + SRCV) in our study (46.67%), which is the same as described by other studies.[4] However, Alsabilah et al. found that RGEV with ASPDV was the most common variant, occurring in 58% of the patients.[10] Our study noticed RGEV with ASPDV (Type II) in 24.45% of patients. Similarly, Sakaguchi et al. found that RGEV with SRCV was the most common variation of GCTH in 53.2% of cases, although we did not encounter isolated RGEV with SRCV cases in our series.[11]

The gastro-colic trunk of Henle is to be isolated for vascular ligation and lymph node dissection in many GI surgeries, especially after the development of laparoscopic and robot-assisted surgeries. Many studies have been carried out in recent years to understand the anatomy and variation of the trunk of Henle via various techniques, which helps to understand the anatomy pre-operatively for better post-operative outcomes and prognosis .[7,12]

The intraoperative identification of the anatomy of the GCT is challenging because of its variable combinations of tributaries, which leads to an increased incidence of bleeding.[6] The authors aim to provide broader recognition and comprehension of the anatomy of GCT among clinicians and stress its importance for meticulous dissection in a wide range of gastrointestinal surgeries, such as pancreaticoduodenectomy and gastrectomy, where the risk of bleeding is minimized, and right hemicolectomy, where lymphatic clearance is achieved by complete meso-colic excision and central venous ligation, while also minimizing the risk of bleeding and vascular injuries. Hence, knowledge of variation in the GCT makes it easier to decrease intraoperative bleeding and subsequent post-operative complications.

CONCLUSIONS

Though variations of GCTH are not uncommon, they need consideration during surgery. In our study, Type I variation formed by the union of the right gastro-epiploic vein, the anterior superior pancreaticoduodenal vein, and the superior right colic vein was most commonly noted (46.67%). Despite the significant heterogeneity of vascular tributaries, the anatomical knowledge of GCTH serves as the foundation for both the interpretation of preoperative radiological images as well as surgical procedures in various gastrointestinal surgeries. The recognition of variations in GCTH during surgery can reduce complications such as intraoperative bleeding with good perioperative results.

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