

Applications of “hand as foot” teaching methods in digestive and visceral surgery: a systemic review

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ABSTRACT: Teaching methods had evolved over the years in order to be more efficient. Nowadays, the trainee has become the core of the education system. Among emerging teaching methods, “hand as foot” has been more and more developed. This systemic review was fulfilled to help clinicians for its applications in digestive and visceral surgery in daily practice manner. It was performed on 17 April 2022 through Medline, Scopus, Web of Science, and Cochrane data base for studies on digestive and visceral surgery related topics. All 26 included articles corresponded to letters to Editor. Four subjects were concerned: anatomy, embryonic development, classifications, and syndromes. The target audience was medical students in all cases. Two main application axes were discussed: surgical and educational applications. Surgical application implicated surgical progress, surgical planning, and surgical safety. Educational application associated three aspects: cognitive knowledge, mapping establishment, and learning efficiency improvement. Although applications of « hand as foot » teaching methods in digestive and visceral surgery interested numerous aspects, the low ranking of the studies, their descriptive character, and the absence of evidence-based medicine studies prevented strong recommendations. Hence, randomized controlled studies comparing this method to well established educating methods have to be conducted in order to determine the right place for this emergent and promising method.

KEYWORDS : The teaching method; Hand as Foot; Medical education; Analogy teaching method; Anatomy; Digestive and visceral surgery

I. BACKGROUND

Teaching methods had evolved over the years in order to be more efficient. It was based on a vertical manner transferring the knowledge from the mentor to the trainee. Nowadays, the trainee has become the core of the education system [1,2]. Hence, the evolution of the teaching methods toward a horizontal manner favoring autonomy and self-controlled path. Among emerging teaching methods, “hand as foot” has been more and more developed first in orthopedics and then extended to other surgical fields [1,2]. The aim of this systemic review was to study the applications of “hand as foot” teaching methods in digestive and visceral surgery.

II. METHODS

This review was carried on according to PRISMA guidelines [3]. For search strategy, four data bases were systematically searched: Medline, Scopus, Web of Science, and Cochrane data base for studies on related topics. This research was conducted based on key words (“hand as foot teaching method” OR “hand figural teaching method” OR “hands and feet figural teaching method” OR “hand as foot teaching method” OR “hand-foot teaching method” OR “hand as foot analogy teaching method” OR “application”) AND (“visceral and digestive surgery” OR “anatomy” OR “disease” OR “classification” OR “embryogenic development” OR “esophagus” OR “stomach” OR “duodenum” OR “pancreas” OR “intestine” OR “colon” OR “appendix” OR “rectum” OR “anal canal” OR “anorectal ring” OR “hepatic” OR “biliary” OR “portal vein” OR “spleen” OR “celiac trunk” OR “Henle trunk” OR “mesenteric” OR “artery” OR “vein” OR “inguinal region” OR “abdominal muscles” OR “digestive tract tumor” OR “congenital diseases” OR “perineal laceration” OR “laparoscopy”) used in titles, abstracts, and/or keywords. It was made by two independent researchers on April 17th 2022. Were included all types of articles on “hand and foot” teaching method about topics around visceral and digestive surgery: systemic reviews, meta-analysis, original articles, case reports, case series, letters and editorials. Excluded articles corresponded to articles with no information about “hand as foot” teaching methods as well as treating subjects not related to visceral and digestive surgery. Included studies were categorized in accordance to teaching field: anatomy, embryogenic development, classification, and pathology application. Concerning study selection, article retrieving flowchart is demonstrated in

Figure 1. Two independent review authors screened all titles and abstracts meeting inclusion criteria. They retrieved all full-text articles for assessment. Disparities were discussed in order to reach consensus. A total of 26 articles were included in the review after exclusion of duplicates and non-relevant articles (Figure 1).

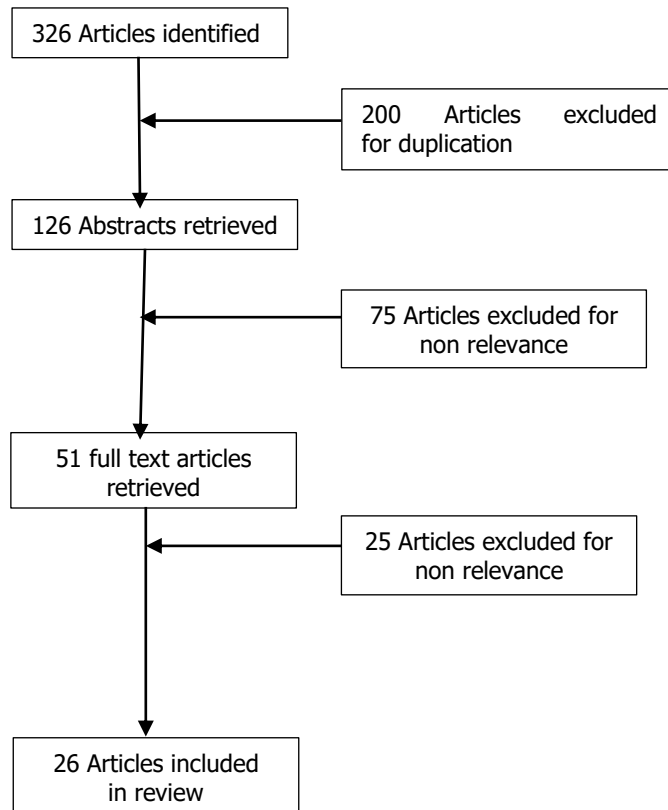


Figure 1. Flowchart for article retrieving process according to PRISMA guidelines [3].

Considering data extraction analysis, Quality Rating Scheme for Studies and Other Evidence and Oxford Centre for Evidence-based Medicine for ratings of individual studies allowed study quality ranking as 5 and 5C respectively in all cases [4,5]. For every article, the presented teaching methods was considered as well as the application mention (Table 1).

Table 1. Literature review for applications of “hand as foot” teaching method in digestive and visceral surgery.

Study	Type	Subject	Target audience	Application
Song et al. [6]	Letter to Editor	Anatomy of celiac trunk	Medical students	Anatomy memorization Three-dimensional structure building Learning efficiency improvement
Jia et al. [7]		Peri gastric arteries anatomy		Anatomy memorization Three-dimensional structure building Learning efficiency improvement Evolving from traditional passive teaching model to active model with senses of achievement.
Han et al. [8] Yongqing et al. [9]		Superior mesenteric artery syndrome		Superior mesenteric artery syndrome pathogenesis understanding Surgery progress Master the etiology and related symptoms of superior mesenteric artery compression syndrome

			Learning efficiency improvement Student teacher interaction enhancement
Ma et al. [10]	Inferior mesenteric artery anatomy Inferior mesenteric artery branches anatomical classification		Anatomy memorization Three-dimensional structure building Gastro-intestinal tumor resection and lymph node dissection anatomical landmarks Learning efficiency improvement
Rong et al. [11]	Henle trunk anatomy		Anatomy memorization Three-dimensional structure building Improving surgical safety for right colectomy, gastrectomy, and pancreatoduodenectomy Learning efficiency improvement through vivid analogy and interaction
Song et al. [12] Deng et al. [13]	Portal vein anatomy		Anatomy memorization Three-dimensional structure building Accurate implementation of the hepatic portal vein related surgery Learning efficiency improvement Strengthening teacher-student interaction Activating classroom atmosphere
Wang et al. [14]	Portal vein traffic branch		Anatomy memorization Three-dimensional structure building Surgery applications in cases of portal hypertension Learning efficiency improvement
Wang et al. [15]	Hepatic anatomy Biliary tract anatomy		Anatomy memorization Three-dimensional structure building Totally laparoscopic approach for right liver graft harvest in a donor with trifurcation of the bile duct Learning efficiency improvement
Liu J et al. [16]	Hepatic anatomy		Anatomy memorization Three-dimensional structure building Correct decisions on the best course of treatment during surgery Learning efficiency improvement
Wang et al. [17]	Hepatocellular carcinoma portal vein thrombosis interventional radiology classification		Hepatocellular carcinoma portal vein thrombosis interventional radiology classification Individualized interventional treatment strategies Learning efficiency improvement Student interest arousal
Fan et al. [18]	Intra-hepatic bile duct anatomy		Anatomy memorization Three-dimensional structure building Biliary modal anatomy and variants knowledge Ensuring surgical planning and safety Learning efficiency improvement
Hu et al. [19]	Extra hepatic biliary duct anatomy Choledochal cysts classification		Anatomy memorization Three-dimensional structure building Right diagnose from biliary imaging Ensuring precise operation procedure Learning efficiency improvement

		Congenital biliary atresia classification		
Fan et al. [20]		Hilar cholangiocarcinoma Bismuth-Corlette classification		Classification memorization Ensuring surgical planning and safety Learning efficiency improvement
Li et al. [21]		Bile-pancreatic ampulla anatomy Extrahepatic biliary system anatomy		Anatomy memorization Three-dimensional structure building Learning efficiency improvement Student interest arousal
Hou et al. [22]		Duodenal anatomy		Anatomy memorization Three-dimensional structure building Learning efficiency improvement Student interest arousal Patient medical knowledge spread
An et al. [23]		Duodenal jejunal loop development		Anatomy memorization Three-dimensional structure building Learning efficiency improvement Student interest arousal
GuDamu et al. [24]		Annular pancreas pathogenesis		Anatomy and pathogenesis memorization Three-dimensional structure building Ensuring surgical safety Learning efficiency improvement Student interest arousal
Zhai et al. [25] Zhang et al. [26] Lei et al. [27]		Appendix anatomy		Anatomy memorization Connection between anatomical site and clinical manifestations Learning efficiency improvement
Jia et al. [28] Shi et al. [29]		Anal canal anatomy		Anatomy memorization Three-dimensional structure building Anal dissection Dividing line between the internal and external anal sphincter Open lateral interne sphincterotomy for chronic anal fissure Learning efficiency improvement
Song et al. [30]		Anorectal ring anatomy		Anatomy memorization Three-dimensional structure building Learning efficiency improvement Student teacher interaction improvement
Rong et al. [31]		Inguinal region anatomy		Anatomy memorization Three-dimensional structure building Master anatomical landmark and anatomical basis for hernia repair surgery Learning efficiency improvement
Rushuai et al. [32]		Digestive tract tumor classification		TNM tumor classification and staging Treatment planning according to classification and staging Learning efficiency improvement Student interest arousal

III. RESULTS

Our systemic review included 26 articles. All these articles corresponded to letters to Editor (Table 1). Four subjects were concerned: anatomy, embryonic development, classifications, and syndromes (Table 1). The anatomical subjects were the biliary tract in four cases [15,18,19,21], the appendix in three cases [25-7], the liver in two cases [15,16], the portal vein in two cases [12,13], and the anal canal in two cases [28,29]. The other anatomical subjects were reported in one case each: bile-pancreatic ampulla [21], duodenum [22], anal canal, anorectal ring [30], inguinal region [31], celiac trunk [6], peri gastric arteries [7], Henle trunk [11], and inferior mesenteric artery [10]. Duodenal jejunal loop development and annular pancreas pathogenesis corresponded to embryonic development topics [23,24]. Pathological conditions were superior mesenteric artery syndrome and portal vein traffic branches [8,9,14]. Classifications for hepatocellular carcinoma portal vein thrombosis interventional radiology [17], choledochal cysts [19], congenital biliary atresia [19], hilar cholangiocarcinoma [20], inferior mesenteric artery branches anatomy [10], and digestive tract tumor [32] were reported in one case each. One subject was reported in 22 articles while two subjects and three subjects were associated in three articles and one article respectively (Table 1). Anatomy was associated to classification in one article [10]. Two anatomical subjects were associated in two articles [15,21]. One article corresponded to anatomical description with two separate classifications [19].

The target audience was medical students in all articles (Table 1). Two main application axes were discussed: surgical application and educational application. Surgical application implicated surgical progress, surgical planning, and surgical safety. Educational application associated three aspects: cognitive knowledge, mapping establishment, and learning efficiency improvement (Table 1). The cognitive knowledge corresponded to anatomy, pathogenesis, and classifications. Mapping establishment was shown for connections between symptoms and syndromes, embryonic development, or anatomic features (Table 1). The learning improvement efficiency consisted in teaching model evolution from traditional passive teaching model to active model, student teacher interaction enhancement, classroom atmosphere activation, as well as student interest arousal (Table 1). One article mentioned another aspect: patient medical knowledge spread [22].

IV. DISCUSSION

Our systemic review identified two major application axes for « hand as foot » teaching methods in digestive and visceral surgery: surgical application and educational application for students and patients. This teaching method was based on hand posture to demystify medical topics. Surgical applications were based on anatomical, embryogenic development, and classification aspects in order to ensure memorization, mind mapping, decision making, surgery planning, and surgical safety [18,24,31,32]. Good memorization with three-dimensional structure building avoids structures damage during surgical removal especially in complex surgeries as in hepatic surgery with portal vein traffic branches for example [14]. The three-dimensional structure building is very useful in laparoscopic surgery as well as surgical planning before the operating room in order to anticipate adverse events and to choose the best option [15,31]. Connections between symptoms and syndromes, embryonic development, or anatomic features allow a better understanding of symptoms, surgical strategy, and evolution [25-7]. Hence, correct diagnoses are more easily made avoiding treatment delay causing morbidity increase [25-7].

For education application, the trainee is nowadays the core of the educational system. The teaching model has evolved from traditional passive teaching model to active model [7]. The trainee has to be motivated with arousal of his interest for anatomical aspects, embryogenic development, and classifications since main reported restraints were uninteresting, boring, complex, and difficult memorizing subjects [8,23]. He has to be shepherded during his educational process in order to acquire knowledge, expertise, and soft skills. Hence, meeting the doctor job description, improving surgical progress, and lowering risks [24]. In another hand, student teacher interaction enhancement and classroom atmosphere activation, allow better environment education, group working, and leadership [6,9]. As for patient knowledge spread, it is mandatory to ensure to the patient a fair and legitime information rather than seeking false or misleading information from unknown sources. That is why, it is important to use simple tools as « hand as foot » to explain, educate, and convince the patient to adhere to his treatment program [22].

Although applications of « hand as foot » teaching methods in digestive and visceral surgery interested numerous aspects, the low ranking of the studies, their descriptive character, and the absence of evidence based medicine studies prevented strong recommendations. Hence, randomized controlled studies comparing this method to well established educating methods have to be conducted in order to determine the right place for this emergent and promising method.

V. CONCLUSIONS

Applications of “hand as foot” teaching methods in digestive and visceral surgery were various. High level studies are needed to evaluate the exact contribution of this teaching methods.

AUTHORS CONTRIBUTIONS

Landolsi Sana: Substantial contributions to the conception, analysis, and interpretation of data for the work.

Touati Dhaker, Youssfi Rahma: Collection and management of the data.

Ideni Marwa, Tourir Wassim: Substantial contributions to the acquisition of the work.

Chebba Faouzi: Final approval of the version to be published

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