Multidisciplinary team meeting before therapeutic ERCP: A prospective study with 1,909 cases

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Key words: endoscopic retrograde cholangiopancreatography, multidisciplinary team meeting, success rate, complication

Abbreviations: MDTM, multidisciplinary team meeting; ERCP, endoscopic retrograde cholangiopancreatography; ERCP, endoscopic retrograde cholangiopancreatography; MDTM, multidisciplinary team meeting; CT, computer tomography; MRI, magnetic resonance imaging; ASOC, acute suppurative obstructive cholangitis; ABP, acute biliary pancreatitis; CBD, common bile duct; SOD, sphincter of oddi dysfunction; IPMT, intraductal papillary mucinous tumor; PSC, primary sclerosing cholangitis; OLT, orthotopic liver transplantation; AJPBD, anomalous junction of pancreaticobiliary duct

Objective: To determine the effect of multidisciplinary team meeting (MDTM) on the success rate and complications of therapeutic endoscopic retrograde cholangiopancreatography (ERCP) for hepato-pancreato-biliary diseases.

Methods: All patients undergoing their first therapeutic ERCP over a 21-month period of time in a tertiary care medical center were included. Generally, patients scheduled for ERCP on Friday, Saturday, Sunday, and Monday were subject to MDTM group, and those on Tuesday, Wednesday, and Thursday were allocated to the control group. For each MDTM case, an MDTM was held on the Tuesday prior to the scheduled ERCP. At the meeting, the cases were discussed by a team consisting of chief physicians, radiologists, endoscopists, anesthetists, and surgeons, and a decision was made on the schedule of ERCP. For control cases, a clinical team of one chief physician and two attending physicians made the decision.

Results: From April 2006 to December 2007, 912 and 997 ERCP procedures were allocated to the MDTM and control groups, respectively. There was no significant difference in the baseline characteristics and indications between the two groups. Although the success rates were not significantly different between MDTM and control groups (82.9% vs. 84.8%, $P=0.321$), MDTM was significantly associated with a decreased overall complication rate of (6.9% vs. 12.0%, $p<0.001$) and severe complication rate (0.4% vs. 2.5%, $p=0.035$).

Conclusions: Pre-ERCP MDTM decreases the frequency and severity of ERCP-related complications, with similar success rate, compared to routine practice.

Introduction

Endoscopic retrograde cholangiopancreatography (ERCP) has evolved from a diagnostic procedure into a primarily therapeutic procedure for a variety of biliary and pancreatic disorders. Therapeutic ERCP is a relatively complex procedure that combines endoscopic, radiographic and surgical techniques and requires multiple skilled personnel. The success largely depends on the collaborative efforts of all involved trained individuals; one weak link may result in the failure of the procedure.¹ In

addition, ERCP can cause a variety of short-term complications including pancreatitis, hemorrhage, perforation, cardiopulmonary problems, and others.^{2,3} The frequency and severity also depend on the cooperation of the involved individuals.

At a minimum, the ERCP procedure involves one endoscopist, one endoscopy nurse for patient sedation and vital sign monitoring, and one nurse for managing guidewires and catheters. Some centers employ a radiologist to aid in fluoroscopy, exposing films, or film interpretation. Some centers add a nurse anesthetist or even an anesthesiologist.¹⁻³

A multidisciplinary team meeting (MDTM) has been defined as a meeting of group of people of different health-care disciplines at a given time to discuss individual patients. It has been recommended that MDTM be conducted for cases with hepato-pancreato-biliary diseases before therapeutic ERCP.⁴ In the Digestive Endoscopy Center of Changhai Hospital, Shanghai,

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pre-ERCP MDTM has been continuously conducted since 1998, which was moderated by a departmental director, and attended by the core team members for the scheduled ERCP, and other physicians, endoscopists, radiologists, anesthetists, and surgeons. At the meeting, the indications, contraindications, and treatment strategies of ERCP and potential risks and complications were discussed. In China, almost all ERCP procedures are performed by gastroenterologists or surgeons, who are specialists in gastroenterology, but not in radiology, especially in computer tomography (CT) or magnetic resonance imaging (MRI). Thus, expertise and opinions are required from the radiologists in order to optimize the procedure and minimize the occurrence of complication.

Despite the decade experience of the pre-ERCP MDTM, its impact on the outcomes of therapeutic ERCP has not been well-defined. Principally, therapeutic ERCP must be performed for right indications, by trained endoscopists using standard techniques, and based on well-documented patient medical record and written informed consent before the procedure.⁵ We hypothesized that the pre-ERCP MDTM may help the endoscopists choose cases with right indications, design the technical procedures that are most suitable, estimate the risks, and ultimately improve the outcomes of the procedure (i.e. achieving success with minimal complications) for individual cases. Therefore, this prospective study was carried out to determine the effect of pre-ERCP MDTM on success rates and complications (including pancreatitis, infection, bleeding, and perforation) of therapeutic ERCP.

Patients and Methods

Structure of the multidisciplinary team

Changhai Hospital is a tertiary referral university hospital, in Shanghai. In the Department of Gastroenterology, which has 133 beds, there were one director, six consultant physician, 12 attending physicians, and about 30–40 resident physicians, forming six relatively independent treatment groups. The Digestive Endoscopy Center consists of six senior endoscopists, each with experience of over 1,000 ERCP procedures. These physicians and endoscopists were involved in the MDTM and ERCP procedures. In addition, two radiologists, one anesthetist, and one surgeon were invited from their respective departments.

Subject selection

All patients underwent their first therapeutic ERCP procedures from April 2006 to December 2007 were included. Referral patients were excluded because the post-ERCP monitoring was to be carried out in other hospitals. Cases with acute suppurative obstructive cholangitis (ASOC) and acute biliary pancreatitis (ABP) were excluded because these cases required emergent ERCP. Patients transferred to other department or refused to sign the informed consent after MDTM were also excluded from our analysis.

All patients gave their written informed consent to participate in the study, which was approved by the Ethics Committee of the Second Military Medical University, Shanghai.

Study design

Patients who were admitted on Friday, Saturday, Sunday, and Monday were allocated to MDTM group, whereas patients who were admitted on Tuesday, Wednesday, and Thursday were allocated to the control group (**Fig. 1**). For the MDTM cases, a meeting was held on the on Tuesday morning. The meeting was moderated by the director, with a discussion panel consisting of consultant physicians, attending physicians and resident physicians in charge of the cases in the department, 1–2 radiologists who had expertise in CT or MRI, 1–2 endoscopists who would perform the ERCP, 1–2 anesthetists, and 1–3 surgeons experienced in biliary and pancreatic surgery. All attending physicians and resident physicians in the department were invited to attend MDTM, mainly for the training purpose. At the meeting, cases with potential indications for therapeutic ERCP were presented and discussed. Briefly, the resident physician in charge of the case reported the case history with further supplementation by the attending physician, and then the radiologists read the CT, MRI or others image films. With the assistance of radiologists, the physicians and endoscopists confirmed the indication. Then, the indications, contraindications, treatment strategies were discussed. The surgeons offered the important information on the conventional operations of the biliary and pancreatic diseases and advice on the choice of ERCP. Finally, the decision was made by the director based on the discussion. There were some the selection of a therapeutic maneuver (placement of pancreatic stent for preventing post-ERCP pancreatitis; selection of type of sphincterotomy: needle knife vs. conventional sphincterotomy) might have been dictated by the pre-ERCP MDTM. The attending physicians in charge of the cases doctor recorded the discussion, and proposed ERCP procedure (**Fig. 2**).

Cases in the control group were discussed at a smaller internal meeting by a relative independent treatment team consisting of a consultant physician, 2 attending physicians, and 4–6 resident physicians (**Fig. 3**). ERCP was considered as a minimally invasive operation which should be conducted preoperative discussion according to the hygienic regulation in China. The decision for a therapeutic ERCP was made by the consultant physician, without consultation to a radiologist, anesthetists and a surgeon

Outcome assessment

The demographic data and indications for ERCP were also collected. The outcome of ERCP procedures, including success

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
MDTM	MDTM	Control	Control	Control	MDTM	MDTM
group	group	group	group	group	group	group

Figure 1. Generally, patients admitted to the hospital on Friday, Saturday, Sunday and Monday were subjects of the MDTM group while those admitted on Tuesday, Wednesday and Thursday were subjects of the control group.

Figure 2. Pre-ERCP multidisciplinary team meeting algorithm (MDTM group)

Figure 3. Conventional algorithm (Control group)

rate, complications and frequency and severity of complications were recorded. The procedure was classified as complete or partial success and complete failure as previously defined.⁶ Technical success of the therapeutic ERCP procedure was defined as follows: Complete success, all the intended procedures for treatment were successful; partial success, some intended procedures

for treatment were not fulfilled, regardless of whether or not the patient was finally referred for a second ERCP; and complete failure, none of the intended procedures for treatment was fulfilled.⁶ Complications were recorded in all patients and also graded as mild, moderate, and severe according to Cotton's criteria.³

Statistical analysis

Statistical analyses were performed using STATA 12.0 (STATA Corporation, College Road, TX, USA.). Results are expressed as mean $\pm$ S.E.M. Comparisons between groups were performed by using the Pearson χ^2 test for categorical variables (or the Fisher exact test if appropriate). A p value of <0.05 was considered significant.

Results

During April 2006 to December 2007, 2130 patients underwent their first therapeutic ERCP procedures. 109 referral patients and 48 patients underwent urgent ERCP were excluded, including 36 patients with ASOC and 12 patients with ABP.

A few cases were not scheduled for ERCP in both groups after preoperative discussion due to financial problem, or refusal to sign the informed consent (14 cases vs. 20 cases). Several patients had operation indication and transferred to department of general surgery (16 cases vs. 14 cases). Since ERCP procedures were not performed in these cases, they were not included in our analysis. Finally, 912 cases were allocated to the MDTM group and 997 cases were to the control group.

The two study groups were similar with respect to baseline demographic characteristics and indications for ERCP (Table 1).

In the MDTM group, complete success, partial success, and complete failure of ERCP were noted in 82.9%, 12.6%, and 4.5% of the cases, respectively. In the control group, the corresponding rates were 84.8%, 10.4%, and 4.8%, respectively, which were not significantly different from those in the MDTM group ($p=0.321$).

A total of 63 (6.9%) cases in MDTM group experienced post-ERCP complications, including 10 cases with infection, 40 with pancreatitis, 9 with bleeding, 3 with perforation, and 1 sudden death due to a cardiovascular adverse event. Complications were observed in 120 cases (12%) in the control group, including 18 cases with infection, 74 with pancreatitis, 26 with bleeding, 1 with perforation, and 1 death due to severe bleeding. The overall complication rate was significantly higher in the control group than in the MDTM group ($p<0.001$). Post-ERCP pancreatitis and bleeding were more frequent in the control group than in the MDTM group (7.4% vs. 4.4%, $P=0.005$ and 2.6% vs. 1.0%, $p=0.008$, respectively).

In the MDTM group, mild, moderate, and severe complications were observed in 5.3%, 1.2%, and 0.4% of cases, respectively, whereas the corresponding rates were 8.0%, 1.5%, and 2.5%, with the overall complications were more severe (6.9% vs. 12.0%, $p=0.035$), and the rate of severe complications (0.4% vs. 2.5%) in the control group than in the MDTM group (Table 2).

Table 1. Demographic data and indications for ERCP in MDTM and control groups

	MDTM group (n=912)	Control group (n=997)	p value
Demographic characteristics			
Age (yr) (Mean $\pm$ S.E.M.)	58.7 $\pm$ 0.5	58.5 $\pm$ 0.6	0.811
Gender			0.496
Male (n, %)	522(57.2%)	586(58.8%)	
Female (n, %)	390(42.8%)	411(41.2%)	
Indications			
CBD stone	431(47.3%)	472(47.3%)	0.971
Chronic pancreatitis	192(21.1%)	208(20.9%)	0.541
Malignant CBD obstruction			
Cholangiocarcinoma	80(8.8%)	89(8.9%)	0.905
Pancreatic cancer	86(9.4%)	88(8.8%)	0.647
Metastatic tumor	31(3.4%)	20(2.0%)	0.059
Benign CBD obstruction	31(3.4%)	39(3.9%)	0.552
Tumor of duodenal papilla	18(2.0%)	23(2.3%)	0.616
Recurrent pancreatitis	11(1.2%)	20(2.0%)	0.167
Others			
SOD	7(0.8%)	6(0.6%)	0.660
IPMT	3(0.3%)	6(0.6%)	0.511
Choledochocyst	3(0.3%)	6(0.6%)	0.511
Pancreatic cyst	9(1.0%)	6(0.6%)	0.341
PSC	2(0.2%)	3(0.3%)	1.000
Biliary problems after OLT	5(0.5%)	8(0.8%)	0.500
AJPBD	3(0.3%)	3(0.3%)	1.000

ERCP, endoscopic retrograde cholangiopancreatography; MDTM, multidisciplinary team meeting; CBD, common bile duct; SOD, sphincter of oddi dysfunction; IPMT, intraductal papillary mucinous tumor; PSC, primary sclerosing cholangitis; OLT, orthotopic liver transplantation; AJPBD, anomalous junction of pancreaticobiliary duct.

Table 2. Success rate and post-ERCP complications in MDTM and control groups

	MDTM group (n=912)	Control group (n=997)	p value
Success			0.321
Complete success	756 (82.9%)	845 (84.8%)	
Partial success	115 (12.6%)	104 (10.4%)	
Complete Fail	41 (4.5%)	48 (4.8%)	
Sum of Complications	63 (6.9%)	120 (12.0%)	<0.001
Severity of Complications			0.035
Mild	48 (5.3%)	80 (8.0%)	
Moderate	11 (1.2%)	15 (1.5%)	
Severe	4 (0.4%)	25 (2.5%)	
Pancreatitis	40 (4.4%)	74 (7.4%)	0.005
Mild	35	59	
Moderate	4	8	
Severe	1	7	
Hemorrhage	9 (1.0%)	26 (2.6%)	0.008
Mild	3	11	
Moderate	4	5	
Severe	2	10	
Cholangitis	10 (1.1%)	18 (1.8%)	0.198
Mild	8	10	
Moderate	2	2	
Severe	0	6	
Perforation	3 (0.3%)	1 (0.1%)	0.540
Mild	2	0	
Moderate	1	0	
Severe	0	1	
Death	1 (0.1%)	1 (0.1%)	1.000

Discussion

This prospective trial demonstrates that MDTM significantly reduces both frequency and severity of therapeutic ERCP-related complications, with similar success rates, compared with the conventional approach, confirming that MDTM is clinical relevant in improving outcomes of ERCP procedures and thus should be implemented in clinical practice, despite its tedious and time-consuming nature.

MDTM brings together relevant health-care workers with specialized knowledge of particular aspects of disease diagnosis or treatment. In some countries, MDTM has already been recommended by clinical practice guidelines for lung cancer, breast cancer and colorectal cancer.⁷⁻¹⁰ To the best of our knowledge, this is the first study reporting the effect of MDTM on the outcomes of ERCP.

There is no doubt that the establishment of MDTM can improve the coordination and communication among departments within a hospital and between hospitals that are involved in a joint meeting. MDTM was established carried out in our center in 1998. The preliminary aim was for education only. Initially, one radiologist with expertise in CT or MRI was invited to the Department of Gastroenterology, to demonstrate how to read

the CT or MRI images, as the information from CT and MRI images are extremely important in preparing the ERCP procedure. All the physicians in the department were asked to take part in the MDTM, at which the indications, contraindications and treatment strategies were discussed. From 2001, endoscopists, anesthesiologists, and surgeons were also invited for the meeting, at which the resident physicians and the attending physicians presented the case, and radiologists reviewed all the images carefully, and the endoscopists proposed the treatment plan based on the clinical presentation, radiological review and subsequent discussions. Finally, the leader of the MDTM, Director of the department made the final decision whether a therapeutic ERCP would be performed.

Success of an ERCP procedure may be categorized in two aspects, procedural success and success in disease resolution. The former can be classified as complete or partial success as defined early, and the latter refers to the “cure” of the disease. In the present study, we only explore the effect of MDTM on the procedural success. Many factors including personnel skill, experience of therapeutic ERCP, patient anatomic or disease factors, equipment or equipment performance, and sedation, may contribute to the success of a therapeutic ERCP procedure.¹¹ MDTM may improve the outcomes of the procedure by offering

the endoscopists much wider more extensive understanding of the case. First, MDTM helps the endoscopists learn the details of patients' information including clinical and radiological characteristics. Second, the difficulty grade and potential risks of the ERCP procedure can be assessed during the MDTM, and ERCP for patients with high grades of difficulty and/or potential risk of severe complications can be either performed by more experienced endoscopists or cancelled and replaced by a surgical operation. Therefore, the treatment strategy can be optimized for every patient during the MDTM.

Indeed, the present study revealed the significant reduction in both frequency and severity of ERCP-related complications. The overall complications were much less in the MDTM group than in the control group. Both pancreatitis and hemorrhage occurred significantly less frequently in the MDTM group than in the control group. It has been suggested that the best way to avoid post-ERCP pancreatitis is to avoid performing ERCP for marginal indications, especially in patients at higher risk of complications.⁵ ERCP should be done for appropriate indications, by trained endoscopists with standard techniques, with well documented patient informed consent and good communication with the patient before and after the procedure. Speculative ERCP, sphincterotomy, and pre-cuts are high-risk for patients. We believe that the MDTM played a very important role in the selecting appropriate indications. After careful discussion by physicians, endoscopists, radiologists and surgeons, the marginal indications for ERCP may have been avoided. Moreover, the patients with high risk were also identified, and the corresponding prevention strategies were recommended during MDTM.

MDTM is also of educational or training values. All the resident and attending physicians were invited for attend the meeting, and learn the basic skills of reading the CT and MRCP images. The gastroenterologists would also learn more knowledge on anesthesiology and radiology, and acquire opinions from surgeons. On the other hand, radiologists and endoscopic anesthesiologists had an intimate knowledge of patients from the physicians.

Despite prospective and large sample size, there are some limitations in the present study. First, the study cases were not

completely randomized, and bias may exist between the patients who were admitted on different days. Second, a few cases were not scheduled for ERCP in both groups after preoperative discussion due to financial problem, or refusal to sign the informed consent. Several patients had operation indication and transferred to department of general surgery. Since ERCP procedures were not performed in these cases, they were not included in our analysis. However, bias may exist as some of these cases might have a high grade of difficulty. Therefore, further complete randomized controlled trial is needed to confirm the beneficial effect of MDTM on ERCP, especially in large endoscopy centers with high ERCP volumes.

In conclusion, pre-ERCP multidisciplinary team meeting significantly reduces the frequency and severity of post-ERCP complications without compromise of the success rate, and thus should be recommended in the clinical practice.

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