

GENERAL ANESTHESIA VERSUS DEEP AND SUPERFICIAL SEDATION IN ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY

Endoskopik Retrograd Kolanjiyopankreatografide genel anestezi uygulamasının derin ve yüzeysel sedasyon ile karşılaştırılması

Manuk Norayik Manukyan¹, Uğur Deveci¹, Abut Kebudi¹, Selçuk Şimşek², Rahmi Çubuk³, Kağan Gökçe¹

Maltepe University, Departments of General Surgery¹, Anesthesiology², and Radiology³, Feyzullah Caddesi, Maltepe, İstanbul / Turkey

Cer San D (J Surg Arts): 2012;5(2): 31-34.

ABSTRACT

The aim of this study is to display the effects of anesthesia method used in patients who underwent endoscopic retrograde cholangiopancreatography (ERCP).

The correlation between the duration of performance, success and complication rates, duration of hospital stay, vital findings, the dosage of iohexol; hyoscine-N-butyl bromide were compared with the anesthesia method.

Higher success rates were obtained from patients administered general anesthesia or deep sedation than patients who received superficial sedation. General anesthesia was observed to shorten the procedure time and significantly decrease the amount of iohexol used. No significant difference were detected between general anesthesia and deep sedation groups with respect to the amount of hyoscine-N-butyl bromide intravenous injection. However, the amount used in the superficial sedation group was statistically higher than other two.

In conclusion, general anesthesia shortens the duration of ERCP, increases success rate and prevents complications likely to develop by decreasing the dose of hyoscine-N-butyl bromide and iohexol.

Key words: ERCP, anesthesia, hyoscine-N-butyl bromide, iohexol.

ÖZET

Çalışmamızın amacı endoskopik retrograd kolanjiopankreatografide kullanılan anestezi yönteminin işlemin sonuçlarına etkilerini ortaya koymaktır.

Endoskopik retrograd kolanjiopankreatografi ve taş çıkarılması işlemi yapılan hastalar çalışmaya dahil edildi. İşlem süresi, başarı ve komplikasyon oranları, hastanede kalış süresi, vital bulgular ve işlem sırasında koledok görüntülemesi için ihtiyaç duyulan ioheksol ve barsak hareketlerini baskılamak için kullanılan hiyosin-N-butil bromür dozu ile hastanın tercih ettiği anestezi yöntemi arasındaki ilişki incelendi.

Genel anestezi ve derin sedasyon ile işlem yapılan hastalarda, yüzeysel sedasyon uygulananlara kıyasla, daha yüksek başarı oranları elde edildi. Genel anestezinin işlem süresini anlamlı olarak kısalttığı ve kullanılan iohekol miktarını azalttığı görüldü. Hyoscine-N-butyl bromür kullanım miktarında genel anestezi ve derin sedasyon uygulanan gruplar arasında fark olmadığı, ancak yüzeysel sedasyon verilen hastalarda dozun diğer iki gruba kıyasla anlamlı derecede yüksek olduğu saptandı.

Genel anestezi işleminin süresini kısaltmakta, başarı oranını artırmakta ve işlem sırasında kullanılan Hiyoşin-N-butilbromür ve ioheksol dozunu azaltarak gelişebilecek komplikasyonların önüne geçmektedir.

Anahtar kelimeler: Endoskopik retrograd kolanjiopankreatografi, anestezi, hyoscine-N-butyl bromür, iohekol.

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is an important method in the diagno-

sis and treatment of diseases of the pancreas, gall bladder and choledochal duct. The process of endoscopic sphincterotomy (EST), used in 1974 for the first

time, has opened up new vistas for whom intend to perform minimally invasive interventions (1,2). Accurate diagnosis and treatment of obstructive jaundice developing due to a stone or a tumor is made with ERCP. The success rate for ERCP and stone extraction in the treatment of obstructions due to choledochal stones is about 90-95% in expert hands (3-5). This process facilitates the treatment of choledochal stones when compared with the surgical method; however, it accompanies some risks such as bleeding, perforation and the development of pancreatitis. ERCP can be performed under general anesthesia and deep or superficial sedation.

The aim of the present study is to display the effects of anesthesia method, used in patients who underwent ERCP and EST due to choledochal stone, on the duration of surgery, on the doses of medications we used and complications.

MATERIALS and METHODS

The data sheets of American Society of Anesthesiologists (ASA) class one and two patients who underwent ERCP and stone extraction under elective conditions due to choledoc stone detected on magnetic resonance cholangiopancreatography by the same surgeon between February 2006 and 2011 were examined. The correlation between the duration of performance, success and complication rates of the procedures, duration of hospital stay, vital findings, the dosage of Iohexol; the contrast agent, required for choledochal imaging during the procedure and hyoscine-N-butyl bromide used to regulate bowel movements were compared with the anesthesia method performed.

A total of 137 patients, who were admitted to the hospital one day before intervention, were asked

for their preference on the type of anesthesia during the anesthetic consultation. Each patient signed an informed consent form. 43 of them underwent ERCP under general anesthesia, deep sedation was produced in 44 patients with i.v. bolus of 0,1 mg/kg midazolam and remifentanil infusion of 0,04-0,1 µg/kg/min by an anesthesiologist. An endoscopist sedated 50 patients with i.v. bolus of 0,1 mg/kg midazolam. 1 gr of ceftriaxone, an antibiotic prophylaxis was administered intravenously 15 minutes before the intervention. The patients with stable vital signs, convenient abdominal examination and normal oral intake were discharged the next day after the intervention. Blood amylase values of patients only with clinical complaint and suspected physical examination were studied.

By using an SPSS 10.0 program statistical analysis of demographic data was done using a chi square analysis. Other paired and unpaired data were analyzed with a two-sample student's t test and Fischer's exact test when appropriate.

RESULTS

No differences were determined among the three group of patients in terms of age, gender and ASA score (Table1). Higher success rates were obtained from patients who were interfered for choledochal stone and administered general anesthesia or deep sedation than patients who received superficial sedation. When the durations of procedures were compared, we determined that duration was significantly shorter in the general anesthesia ($p<0.008$) group than both deep sedation ($p<0.007$) and superficial sedation ($p<0.00$) groups. Also deep sedation was observed to shorten the procedure time compared to superficial sedation (Table 2).

	General Anesthesia	Midazolam + Remifentanil	Midazolam
Number	43	44	50
Age	55±11	54±8	53±10
Sex (M/F)	20/23	20/24	23/27
ASA (1/2)	16/27	12/22	15/35

	General Anesthesia	Midazolam + Remifentanil	Midazolam
Duration of ERCP (min)	40.6±11.5	50.2±13.2	61.6±16
Amount of Iohexol	17.8±5.4	21.6±5.8	26.7±6.2
Amount of hyoscine-N-butyl bromide	20.3±8.5	25±10.6	30.8±9.2
Success rate %	96	92	83

The amount of iohexol used to visualize the choledoc and the stone during ERCP were found to be significantly lower in the general anesthesia group than both deep ($p<0.02$) and superficial ($p<0.00$) sedation administered groups. When the superficially

sedated group was compared with the deeply sedated group, deep sedation was established to decrease the amount of iohexol ($p<0.005$) (Table 2).

No significant difference ($p<0.87$) was detected between general anesthesia and deep sedation

groups with respect to the necessary amount of Hyoscine-N-butyl bromide intravenous injection to facilitate papilla cannulation by regulating bowel movements; however, the amount used in the superficial sedation group was statistically higher than other two (Table 2).

Although no pancreatitis was diagnosed in the general anesthesia group, three patients each in deep and superficial sedation groups exhibited acute pancreatitis. No complications developed following the support treatment. One patient in deep sedation group exhibited a decrease in oxygen saturation, so the procedure was stopped. Bleeding after the EST in two of the patients of general anesthesia group was controlled with sclerotherapy.

DISCUSSION

ERCP is a very beneficial method in the diagnosis and treatment of diseases of the biliary tract and the pancreas. However, to obtain successful ERCP results, a proper milieu and experienced hands are indispensable. Even everything is performed according to the rules, bleeding, cholangitis, pancreatitis, duodenal perforation and gram-negative sepsis are major life-threatening complications and the mortality rate of 0.3% must always be kept in mind (5-7). In general, insignificant and spontaneously self-ceasing post-sphincterotomy bleeding occurs. However, only 2-3% of patients require blood transfusion (7,8). An asymptomatic amylasemia develops after ERCP. Like bleeding clinical pancreatitis also develops at an approximate rate of 2-3%.

In numerous studies various anesthesia methods used in ERCP have been examined and the advantages and disadvantages of these methods have been emphasized (9-12). Nevertheless, in the literature the correlation between the anesthesia method and operation success and complication rates have been hardly investigated (13). The major objective of the present study is to investigate the effects of sedation obtained using three different anesthesia methods, in different values on ERCP process. Only ASA 1 and 2 patients were included to the study in order to enable patients to choose one of three anesthesia methods.

As we do, most endoscopists favor midazolam for its fast onset of action, short duration of action, and high amnestic properties. It is a very popular agent for conscious sedation. Opioids, such as fentanyl administered intravenously, provide both analgesia and sedation. Fentanyl has a more rapid onset of action and clearance and has a low incidence of nausea (14,15). Combinations of benzodiazepine and opioid agents are frequently used for synergism and provide deep sedation. Specific antagonists of opiates (naloxone) and benzodiazepines (flumazenil) are available and should be present and readily available in every endoscopy unit. As stated in the guidelines of ASA, a patient targeted for one level of sedation may become more deeply sedated than planned. Thus, a physician targeting moderate seda-

tion must be able to rescue a patient who is deeply sedated. Similarly, an ability to rescue a patient from general anesthesia is necessary when providing deep sedation. Therefore in our study deep sedation was administered by an anesthesiologist. However, no serious complications associated with three anesthesia methods we administered, were detected. Due to decrease in oxygen saturation during deep sedation one of the patients was intubated but the ERCP was successfully completed. All patients returned to their room successfully after the operation.

When we examine the results of the present study, the success rate was higher and the procedure time was significantly shorter in the general anesthesia group. It is tempting to speculate that those patients, who undergo ERCP with less experienced endoscopists, in particular may benefit from the general anesthesia technique (9). There was a tendency toward less frequent ERCP related complications under the improved conditions provided by general anesthesia compared to intravenous sedation, since general anesthesia technique offers less patient movement than the prior technique. It has been reported that additional time for preparation is required for ERCP under general anesthesia, with induction of anesthesia and intubation of the patient (9,16). In addition, 30-40 minutes of surveillance in a post anesthesia care unit have to be added to the additional time required for ERCP under general anesthesia as a further limitation on providing general anesthesia for ERCP (9,16). However, the high failure rate of ERCP when intravenous sedation was used, in comparison with ERCP under general anesthesia not only causes medical and other serious problems, it can also be assumed that there are additional costs when ERCP fails. This could be related to longer hospitalization periods when the procedure has to be repeated, or when surgical interventions become necessary.

Cannulation of the papilla during ERCP is the most difficult step of the procedure. Anticholinergic hyoscine-N-butyl bromide used to decrease bowel movements has been known to cause cardiopulmonary complications at high doses (17-19). Christensen et al reported that dose as 40 mg (18). Although, the mean dose used in all three groups in our study is below this limit, the limit exceeded especially in some patients of i.v. bolus of 0,1 mg/kg midazolam sedation group. It can be claimed that management of general anesthesia or deep sedation decreases patient movements so time required for papilla cannulation shortens and hyoscine-N-butyl bromide dose used decreases; this might prevent rare complications which are likely to develop.

Iohexol is a common agent used to visualize choledochus after papilla cannulation in ERCP. Control cholangiography is required following choledoch clearance after sphincterotomy. This agent may lead to serious problems in patients with kidney failure (20,21). Chong reported ionicity may play a significant role in the incidence of ERCP induced panc-

reatitis (22). Draganov et al reported the mean dose of 22 ml iohexol (20). In our study, 17 ml iohexol was used for the general anesthesia group, which is statistically less than that of the other two groups. No nephrotoxicity developed in our study, probably because only ASA 1 and 2 patients were included. However, general anesthesia will be a good preference to decrease the amount of iohexol to be used in patients with high BUN creatinine levels before the process.

In conclusion, general anesthesia shortens the duration of ERCP, increases success rate and prevents complications likely to develop by decreasing the dose of hyoscine-N-butyl bromide and iohexol.

REFERENCES

1. Classen M, Demling L. Endoscopic sphincterotomy of the papilla of Vater and extraction of stones from the choledochal duct. *Dtsch Med Wochenschr.* 1974 ;99:496-7.
2. Kawai K, Akasaka Y, Murakami K, Tada M, Koli Y. Endoscopic sphincterotomy of the ampulla of Vater. *Gastrointest Endosc.* 1974;4:148-51.
3. Sherman S, Gottlieb K, Lehman GA. Therapeutic biliary endoscopy. *Endoscopy.* 1994;26:93-112.
4. Ott DJ, Young GP, Mitchell RG, Chen MY, Gelfand DW. Therapeutic ERCP: spectrum of procedures performed in 60 consecutive patients. *Abdom Imaging.* 1994;19:30-3.
5. Turan M, Karadayı K, Duman M, Koyuncu A, Aydın C, Topcu Ö. Endoskopik retrograd cholangiopancreatography deneyimimiz. *CÜ Tıp Fak Der* 2003; 25(4):171-6.
6. Sherlock S, Dooley J. Imaging of the biliary tract: Interventional Radiology and Endoscopy. In: Goldblum JR, Odze RD (Eds), *Disease of the Liver and Biliary System.* 29. Chapter, 9. Baskı, Oxford, Blackwell. 1995, p:532-47.
7. Freeman ML. Adverse outcomes of endoscopic retrograde cholangiopancreatography. *Rev Gastroenterol Disord.* 2002;2:147-68.
8. Barthet M, Lesavre N, Desjeux A ve ark. Complications of endoscopic sphincterotomy: results from a single tertiary referral center. *Endoscopy.* 2002;34: 991-7.
9. Amornytin S, Na-pomphet S, Wongwathanyoo T, Chalayonnavin V. Anesthesia for Endoscopic Retrograde Cholangio-Pancreatography (ERCP) from 1999-2003 in Siriraj Hospital: A retrospective study. *Med Assoc Thai* 2004;87:1491-5.
10. Kongkam P, Rerknimitr R, Punyathavorn S ve ark. Propofol infusion versus intermittent meperidine and midazolam injection for conscious sedation in ERCP. *J Gastrointestin Liver Dis* 2008;17:291-7.
11. Zippi M, Traversa G, De Felici I ve ark. Sedation with propofol in endoscopic retrograde cholangiopancreatography: personal experience. *Clin Ter.* 2008;159(1):19-22.
12. Wehrmann T, Kokabpick S, Lembcke B, Cas-pary WF, Seifert H. Efficacy and safety of intravenous propofol sedation during routine ERCP: a prospective, controlled study. *Gastrointest Endosc.* 1999;49(6):677-83.
13. Raymondos, K Panning B, Bachem I, Manns MP, Piepenbrock S, Meier PN. Evaluation of ERCP under conscious sedation and general anesthesia. *Endoscopy* 2002;34(9)721-6.
14. Waring JP, Baron TH, Hirota WK ve ark. Guidelines for conscious sedation and monitoring during gastrointestinal endoscopy. *Gastrointest Endosc* 2003;58:317-22.
15. Koshy G, Nair S, Norkus EP, Hertan HI, Pitchumoni CS. Propofol versus midazolam and meperidine for conscious sedation in GI endoscopy. *Am J Gastroenterol.* 2000 ;95(6):1476-9.
16. Etzkorn KP, Diab F, Brown RD. Endoscopic retrograde cholangiopancreatography under general anesthesia: indications and results. *Gastrointest Endosc* 1998;47:363-7.
17. Katsube T, Kon-No S, Hamaguchi K ve ark. Scopolamine raises cardiac demand in the elderly during gastrointestinal endoscopy. *Hepatogastroenterology.* 2005;52(65):1463-6.
18. Christensen M, Matzen P, Schulze S, Rosenberg J. Complications of ERCP: a prospective study. *Gastrointest Endosc.* 2004;60(5):721-31.
19. Yoshikawa I, Yamasaki M, Taguchi M ve ark. Comparison of glucagon and scopolamine butylbromide as premedication for colonoscopy in unседated patients. *Dis Colon Rectum.* 2006;49(9):1393-8.
20. Draganov PV, Forsmark CE. Prospective evaluation of adverse reactions to iodine-containing contrast media after ERCP. *Gastrointest Endosc.* 2008;68(6):1098-101.
21. Hill JA, Winniford M, Cohen MB ve ark. Multicenter trial of ionic versus nonionic contrast media for cardiac angiography. The Iohexol Cooperative Study. *Am J Cardiol.* 1993;72(11):770-5.
22. Chong J, Barkın JS. Analysis of comparative studies using different contrast agents for endoscopic retrograde cholangiopancreatography. *Dig End* 1993; 5:206-21.