Annals of Gastroenterology (2012) **25,** 279-280

Reducing radiation risks during ERCP: less is more

Thomas J. Savides

University of California, San Diego, USA

Quality ERCP includes safety as well as efficacy. During ERCP, safety not only refers to immediate risks to the patient such as pancreatitis, bleeding and perforation, but also includes radiation risks to both the patient and the medical providers. There are numerous factors associated with radiation risk, including proper education and use of equipment, shielding of personnel, and procedure performance.

The study by Katsinelos and colleagues in this issue of *Annals of Gastroenterology* prospectively evaluates clinical parameters related to fluoroscopy time during ERCP. The majority of patients were undergoing ERCP for an indication of choledocholithiasis (79%) or malignancy (9%). Nearly all the procedures (99%) were therapeutic in terms of endoscopic sphincterotomy, stone extraction, mechanical lithotripsy, and/or stent placement. Multivariate analysis found that variables significant for increased fluoroscopy time included choledocholithiasis, two or more stones, stone size greater than 10 mm, needle-knife papillotomy, periampullary diverticulum, and mechanical lithotripsy with stent placement [1]. All of these parameters are related to more technically challenging ERCP than one would encounter during removal of a small (<10 mm) stone or placement of a stent for distal biliary obstruction. This study confirms previous studies that more complicated therapeutic ERCP cases require greater fluoroscopy time than less complex procedures [2-5].

Perhaps an even more interesting aspect of this study is that this single experienced endoscopist used an average of only 49 sec of fluoroscopy per case. Nearly all of the cases (99%) required some form of therapy. In contrast, most published research studies related to radiation exposure during ERCP report mean rates of over 300 sec (5 min) [2,3,5-9]. The endoscopist in the current study performed a high volume of cases, more than 350 per year, during the study period. This confirms other studies that have also shown high volume endoscopists (>200 ERCP per year) have significantly shorter fluoroscopy times than endoscopists performing fewer procedures (especially <100 ERCP per year) [10]. Additionally, fluoroscopy time is inversely correlated with endoscopist experience, with a reported decrease in fluoroscopy time of 20% for every ten years of experience [4,10].

Correspondence to: Thomas J. Savides, MD, Prof. of Clinical Medicine, University of California, San Diego, USA, e-mail: tsavides@ucsd.edu

Conflict of Interest: None

Received 5 June 2012; accepted 5 June 2012

A recent 2012 European Society of Disease Endoscopy (ESGE) guideline on radiation protection had several recommendations for reducing radiation exposure during ERCP [11]. These included positioning the patient as far as possible from the x-ray tube, limiting fluoroscopy time, using pulsed fluoroscopy instead of continuous fluoroscopy, selecting the lowest reasonable image quality, collimate the X-ray beam to the smallest practical size, avoid unnecessary magnification, limit taking radiographic still images, and have experienced endoscopists perform more complex cases.

One can speculate on why experienced endoscopists might utilize less fluoroscopy time. A large part of this might be awareness of risks of radiation exposure that occurs over time, not to mention concern for their own cumulative radiation exposure. Experienced endoscopists may control the foot peddle for the fluoroscopic imaging (or have a good working relationship with the person who does), and so not have time delay in assessing the image as can occur if a radiologist or radiology technician independently controls the fluoroscopic imaging. They may have greater initial success at cannulation (perhaps using wire-guided techniques) and thus need less fluoroscopic imaging for initial cannulation. They also may be part of regional centers with access to non-ERCP biliary imaging such as MRCP and EUS, which can inform the endoscopist of the expected underlying pathology before the ERCP. Knowing the definite pre-ERCP pathology (i.e. bile duct stone or pancreatic tumor), can then mean less diagnostic fluoroscopy time is required and the fluoroscopy can be used only for what is needed to perform the therapeutic procedure.

Over the past decade there has been an increasing emphasis on quality performance in endoscopy, and this includes quality ERCP. Potential metrics for ERCP quality include number of cases per year, percentage of diagnostic versus therapeutic cases, complexity of cases, success of deep biliary cannulation (when relevant), success at removal of bile duct stones (<10 mm), success in relieving distal biliary obstruction, and immediate adverse events (i.e. pancreatitis, bleed, perforation) [12,13]. Perhaps fluoroscopy time should also be included as another ERCP quality indicator, given that there seems to be great variability in the amount of radiation exposure to patients and medical providers based on complexity of procedures as well as endoscopist experience.

Hopefully studies such as this by Katsinelos *et al* will encourage all of us to evaluate factors which influence fluoroscopy times in our units during ERCP, and anticipate challenging cases and consciously limit fluoroscopic imaging to when only absolutely needed.

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