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EDITORIAL

Risk of Stent Migration in Intended Long-Term Biliary Plastic Stents: Is Being Straight Good?

Amit Kumar[1,2]

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In 1980, Soehendra and Reynders-Frederix [1] first described endoscopic biliary stenting, a procedure that revolutionized the management of obstructive biliary diseases. Though endoscopic biliary sphincterotomy with stone extraction is the standard of care for common bile duct stones (CBDS) with a safety profile superior to surgery, stone extraction by balloon or basket may fail in 10–15% patients due to reasons such as stone diameter > 15 mm, > 3 stones, and unfavorable bile duct anatomy (distal CBD narrowing/angulation, large periampullary diverticulum) [2]. These difficult-to-remove CBD stones can be removed with more complex endoscopic techniques such as mechanical, laser, extracorporeal or electrohydraulic lithotripsy. Though surgical CBD exploration is usually reserved for failure or unavailability of all of these interventions, significant comorbidities in elderly patients may preclude multiple endoscopic interventions or surgery. In this subset of patients, long-term biliary stenting [3, 4] may be used with either repeated planned exchanges or as a one-off procedure with exchanges reserved solely for obstruction, cholangitis or migration.

Indwelling stents provide biliary drainage, prevent stone impaction, and reduce the incidence of cholangitis. They may also fragment large stones, with either spontaneous passage over time or easy extraction during subsequent endoscopic procedures. It is believed that respiratory and other regular movements grind the stones against the stent, with eventual mechanical disintegration. In a study of 45 patients with irretrievable CBD stones (IBDS), decreased stone size was observed in 73% patients and stone disappearance was seen in 22% [5] after 6 months of biliary stenting as rescue therapy. Ueda et al. also observed resolution of CBDS in 48.5% (32/66) patients over 3–6 months following biliary stenting [6].

✉ Amit Kumar
docamitkr@gmail.com

[1] AFMC, Pune, India

[2] PGIMER, Chandigarh, India

Stent obstruction and migration are important factors that can offset the benefit of long-term biliary stenting in IBDS [7]. Numerous studies have reported stent migration rates ranging from 5–10% [8] with distal migration observed in 3–6% of patients [9]. Several patient, endoscopic, or stent-related factors predispose to stent migration, including benign biliary stricture (since benign strictures are looser than are malignant strictures, migration is more frequent), a dilated CBD, prior sphincterotomy, and the use of straight, wide, or longer stents [10]. The frequency of migration decreases when > 2 stents are placed (multiple stents are held more tightly and friction between them decreases movement) [11].

Plastic stents are available in straight and pigtail conformations; both have been used for long-term drainage of CBD in IBDS [12, 13]. Double pigtail stents have a lower migration risk due to anchoring provided by the pigtail loop, compared with straight stents where the stent axis parallel to CBD increases the risk of migration. Despite these observations, the use of straight stents [3] for drainage in IBDS is far greater than the use of pigtail stents [14] in the majority of published studies.

In this issue of *Digestive Disease and Sciences*, Paspatis et al.[15] reported the frequency of distal migration of plastic stents in patients with IBDS based on a single-center retrospective comparative study. Plastic stents of length 7–12 cm and diameter 7–11.5F were placed in this study. The stents were either replaced regularly at scheduled 3–6 monthly intervals or left in situ for indefinite periods with 3–6 monthly monitoring of the patients' clinical condition and replaced as needed. The authors randomly placed 289 straight stents (Group A) and 329 double pigtail stents (Group B). The rate of distal stent migration (DSM) was 17.3% in group A and 27.4% in group B ($p = 0.002$). The DSM rates were 8.4% and 14.6% at 6 months, 21.4% and 27.7% at 12 months, 27% and 43.5% at 18 months, and 37.2% and 60.4% at 24 months, for groups A and B, respectively ($p = 0.004$, log-rank). The authors recorded higher

risk of distal migration with double pigtail stents (adjusted HR = 7.38, 95% CI: 1.05–51.91; $p = 0.04$). The risk of cholangitis or stent block was not significantly different between the two groups. The authors concluded that probability of DSM is higher when double pigtail stents are used.

Few studies have previously compared migration of straight and double pigtail stents when placed indefinitely for the treatment of irretrievable stones. Tohda et al.[16] studied 7F straight stent placement in 87 patients with IBDS. Over 12 months of observation, stents were exchanged within 6 months in 35 subjects, and in the remaining 17 only when needed. DSM was reported in 5.7% patients over 6 months, in 2.9% patients over 12 months and in 11.8% patients when left in situ indefinitely. Moreover, the major indication for repeat ERCP was acute cholangitis rather than DSM. In comparison, Jain et al., in a study of 7F double pigtail stent placement in 20 patients (mean CBD stone size of 16 mm) reported that stent migration occurred in 5% patients over a period of 6 months [17]. Nevertheless, the lack of prospective randomized comparative studies along with significant heterogeneity, including the indications for stenting, the location of strictures, as well as diameter and length of the stents placed, complicates drawing firm conclusions on the basis of these studies. Further significant heterogeneity exists between the current and earlier studies, as there are not many cross-sectional studies addressing DSM. The indications (benign vs. malignant strictures, proximal vs. distal location) for ERCP and the stents used (straight or double pigtail of varying sizes) provide additional heterogeneity, further confounding interpretation of the data.

In conclusion, long-term biliary stenting is an effective management option for the often-challenging management of IBDS. Though the optimal timing of stent exchange is uncertain, frequent exchanges defeat the goal of minimal intervention in high-risk populations. During long-term stent placement, however, stent migration is an important concern that limits their safety and efficacy. Though the present study helps dispel traditional notions regarding the stability of double pigtail stents, the literature is far from settled in this regard, leaving open the options for either for long-term use.

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