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Review Article

Gastric Outlet Obstruction Caused by a Migrated Biliary Stent: A Review of Published Cases

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Abstract

Background: Biliary stent migration is the commonest mechanical failure of endoscopic stenting. Gastric outlet obstruction appears in complication lists and individual reports but has never been counted.

Objective: To set out what the published record contains on gastric outlet obstruction from a migrated stent, against the well-measured parent complication.

Methods: Narrative review of published cohort studies, pooled case analyses and individual case reports.

Findings: Migration rates across cohorts were consistent, from 74 of 876 stented patients (8.4%) to 11.4% of 295 plastic stents. Only three published records involve the gastroduodenal outlet, and in all three the duodenum was narrowed by tumour, so the stent was not clearly the obstructing object. No study reports a denominator for this complication.

Conclusions: The published record supports imaging the vomiting patient and searching widely for the stent; it does not support any rate for outlet obstruction, which remains reported and unmeasured.

Keywords: Biliary stent; Stent migration; Gastric outlet obstruction; Duodenal obstruction; Endoscopic retrieval

Introduction

Endoscopic biliary stenting is among the commonest therapeutic manoeuvres in the pancreaticobiliary tract, and stent migration is its commonest mechanical failure. Migration has been counted repeatedly and consistently: five independent cohorts, spanning three decades and several thousand stents, give proximal and distal migration rates that agree to within a few percentage points [1,2,3,4,5]. The consequences of migration have also been catalogued, from asymptomatic passage in the stool to duodenal erosion, bowel perforation and death [6,7,8].

Gastric outlet obstruction sits awkwardly inside that literature. It is named in complication lists, it is illustrated by individual reports, and it has never been counted. No study located for this review reports an incidence, a rate or a denominator for gastric outlet or proximal duodenal obstruction caused by a migrated biliary stent, and the classifications that do exist group all luminal obstruction together without separating the gastroduodenal site from the small bowel or colon [6,8]. Any statement of the form "gastric outlet obstruction occurs in x per cent of migrated stents" would therefore be manufactured.

This review is written accordingly, and its shape should be stated at the outset. It is a well-measured account of the parent complication and a case-level account of this particular one. Every clinical particular below comes from a published record; no patient of the authors is described anywhere, and no patient was treated by the authors. The published case material is smaller and less coherent than the topic's presence in review articles suggests, and setting out exactly how small it is, rather than assembling a case series that does not exist, is the principal purpose of what follows.

Migration Rates in Published Cohorts

The measured rates are close to one another. In the earliest large series, 807 biliary and pancreatic stents were placed and 589 had follow-up; proximal migration occurred in 4.9% and distal migration in 5.9% of those 589 [1]. In 524 stenting procedures at a tertiary centre, overall plastic stent migration was 8.58%, comprising 4.58% proximal and 4.00% distal [2]. Among 876 stented patients, migration occurred in 74 (8.4%), 3.0% proximally and 5.5% distally [3]. In a benign-disease cohort of 295 plastic stents in 211 patients, migration affected 11.4% of stents, evenly divided at 5.7% proximal and 5.7% distal [4]. In 402 ERCP procedures with plastic biliary stents, distal migration occurred in 25 (6.2%) and proximal migration in 20 (5.0%) [5].

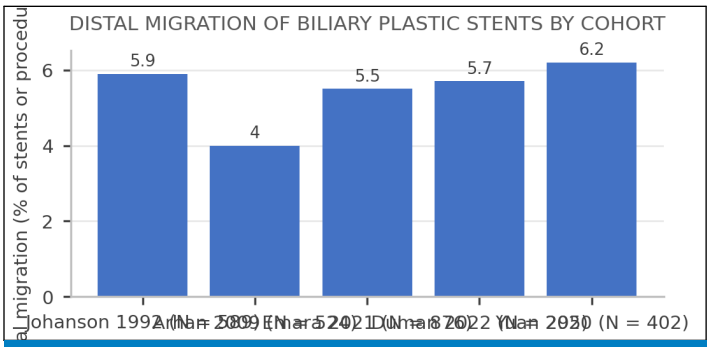

Figure 1: Distal migration of biliary plastic stents in five independent cohorts, which agree to within about two percentage points (N = 589, 524, 876, 295 and 402 stents or procedures respectively) [1,2,3,4,5].

Tube stents behave differently. Across a series of biliary tube stents the overall migration frequency was 3.5%, but the figure varied by indication from 1.6% (3 of 190) for common bile duct stones to 6.5% (4 of 62) in chronic pancreatitis, 14.3% (2 of 14) in autoimmune pancreatitis and 33.3% (2 of 6) after surgical complications [9]. Straight plastic stents in a further cohort migrated proximally in 6.5%, involving 74 cases [10].

Metal stents cannot be placed on the same scale from primary data verified here. The comparison that is firmly established is relative rather than absolute: in a meta-analysis of randomised trials of covered against uncovered self-expandable metal stents for distal malignant biliary strictures, the odds ratio for migration was 5.11 (95% CI 1.84-14.17) in favour of uncovered stents,

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alongside an odds ratio of 2.46 (1.37-4.43) for sludge and 0.21 (0.09-0.50) for tumour ingrowth [11]. Fully covered metal stents are recognised as the design most prone to displacement, but the absolute percentages circulating in the review literature rest on heterogeneous series and are not quoted here as figures [12].

Determinants of Migration

Indication is the strongest single determinant. Migration was far commoner in benign than in malignant strictures, 13.7% against 5.3% among 524 procedures (204 benign, 320 malignant; p = 0.001) [2], and distal migration specifically was 10.2% (16 of 157) with benign indications against 3.7% (9 of 245) with malignant ones among 402 procedures (p = 0.008) [5]. A tumour that grips the stent holds it in place; a dilated benign duct does not. The same reasoning explains why the indication that most often produces a tumour-narrowed duodenum, and therefore the anatomy in which an outlet obstruction could arise, is also the indication in which migration is least frequent.

Geometry and dwell time modify the risk in both directions. Stents of 10 cm or longer migrated distally in 10.6% (19 of 180) against 2.7% (6 of 222) for shorter stents (p = 0.001), and a stent projecting more than 2 cm above the proximal end of the stricture carried an odds ratio of 5.67 (1.55-20.77) for distal migration; a benign stricture gave an odds ratio of 2.97 (1.21-7.28) and an indwelling time under three months 3.11 (1.24-7.81) [5]. Proximal migration of straight stents ran the other way, being predicted by a 7 Fr calibre (OR 18.25, 6.5-50.64), a length under 10 cm (OR 8.53, 3.2-22.47), sphincteroplasty at the index procedure (OR 5.68, 2.7-11.89) and delayed ERCP beyond three months (OR 15.28, 8.1-28.49) [10]. In benign strictures, short stents migrated proximally in 77% of instances and long stents distally in 73% (p = 0.008) [2]. Complete sphincterotomy, balloon dilation, marked duct dilation and indwelling beyond one month were independent predictors in a further cohort of 876 [3].

Table 1: Published cohorts reporting proximal and distal biliary stent migration, with the denominator and stent type for each.

Study	N	Stent type	Proximal	Distal
Johanson 1992	589	Plastic biliary and pancreatic	4.9%	5.9%
Arhan 2009	524	Plastic biliary	4.58%	4.00%
Emara 2021	876	Plastic biliary	3.0%	5.5%
Duman 2022	295	Plastic, benign disease only	5.7%	5.7%
Yuan 2020	402	Plastic biliary	5.0%	6.2%

Published Cases Involving the Gastroduodenal Outlet

Ten published records were examined in detail for this review, and only three involve the gastroduodenal outlet at all. In the first, an 82-year-old woman with periampullary carcinoma who had received an uncovered biliary metal stent presented with persistent postprandial vomiting and early satiety; computed tomography and endoscopy showed the stent lying free in the stomach together with marked narrowing of the second part of the duodenum by the enlarging tumour, and the authors reported it as the first description of a biliary metal stent migrating into the stomach [13]. In the second, a patient with unresectable malignant distal biliary obstruction presented seven months after placement of a partially covered metal stent with frequent vomiting, gastric distension and tumour obstruction of the descending duodenum; the stent had passed into the stomach through a spontaneous choledochoduodenal fistula proximal to the obstruction and was managed with a duodenal stent and a new biliary stent [14]. In the third, a 57-year-old man with metastatic periampullary carcinoma presented with cholangitis and a blocked double-pigtail stent, with imaging showing gastric outlet obstruction and infiltrative narrowing from the D1/D2 junction to the papilla; the stent could not be reached transorally and was retrieved with rat-tooth forceps through the afferent limb of an endoscopic ultrasound-guided gastrojejunostomy [15].

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Table 2: Published cases of obstruction, impaction or perforation by a migrated biliary stent, marked by whether the gastroduodenal outlet was involved; in all three outlet cases the duodenum was narrowed by tumour.

Case	Age, sex; indication	Stent; interval	Outlet involved	Mechanism, management, outcome
Ki 2008	82, female; periampullary carcinoma	Uncovered metal; not stated	Yes, duodenum narrowed by tumour	Stent lying free in obstructed stomach; management and outcome not stated
Katakura 2012	Not stated; malignant distal biliary obstruction	Partially covered metal; 7 months	Yes, obstruction tumoral	Migration to stomach through choledochoduodenal fistula; duodenal stent and new biliary stent
Sundaram 2022	57, male; metastatic periampullary carcinoma	Double-pigtail plastic; not stated	Yes, obstruction tumoral	Blocked migrated stent retrieved with forceps through EUS-guided gastrojejunostomy; successful
Nudelman 2024	73, female; benign biliary disease	Not stated; neglected after loss to follow-up	No, ileum	Impaction in adhesion-narrowed ileum; small-bowel resection
Desai 2025	20s, female; Mirizzi syndrome	7 Fr by 7 cm plastic; about 8 weeks	No, second part of duodenum	Perforation into retroperitoneum; endoscopic removal and clip closure; recovered
Jadallah 2019	63, female; malignant biliary stricture	Plastic; 24 hours	No, duodenum	Intraperitoneal perforation; drain, endoscopic extraction, clip; recovered
Garg 2011	Not stated, male; bile duct stones	10 Fr by 4 cm plastic; 10 days	No, jejunum	Impaction across lumen; milked into duodenum at operation and removed; later death from liver failure

The distinction that matters is mechanistic. In the second and third of these the outlet obstruction was tumoral, and the migrated stent was an associated finding or the object retrieved through the obstruction rather than its cause. In the first the duodenum was likewise narrowed by tumour, so that the stent's displacement into an obstructed stomach is at least as plausibly a consequence of distal obstruction as its cause. Mechanical gastric outlet obstruction by an impacted biliary stent itself is therefore not documented as a series anywhere in this material. A related technical report describes removal of a migrated biliary stent using an enteral stent as a conduit in a patient with non-resectable pancreatic adenocarcinoma, prior loop gastrojejunostomy and gastric outlet obstruction, but its clinical particulars were not available and it is cited for technique only [16].

Impaction and Injury Beyond the Outlet

What is documented, and documented well, is impaction elsewhere in the gut, from which the mechanism at the outlet can be inferred but not measured. A 73-year-old woman whose stent had been neglected after loss to follow-up presented with small-bowel obstruction from a stent embedded in the ileal wall at a segment narrowed by adhesions, requiring resection [17]. A man with decompensated cirrhosis developed small-bowel obstruction on day 10 after a 10 Fr by 4 cm stent lodged perpendicular to the jejunal lumen; endoscopic retrieval failed and the stent was milked proximally into the duodenum at operation without enterotomy, though he later died of progressive liver failure and sepsis [18]. Metal stents impact in the same way [19]. The common element is a rigid tube meeting a fixed narrowing, which is precisely the configuration a tumour-narrowed duodenum provides.

Perforation is the better-counted neighbouring complication. Duodenal injury followed 36% (9 of 25) of distal migrations and 2.2% of all 402 procedures, with frank perforation in 1 of 402 (0.2%) closed by endoclips; the interval from placement to injury ranged from 3 days to 11 months, one patient perforating at 3 days [5]. Iatrogenic duodenal perforation caused by stenting and by stent migration has been reviewed as a distinct entity for two decades [20]. In a consecutive series of 1227 endoscopic retrograde cholangiographies, stent-migration-induced duodenal perforation occurred in 13 patients, a prevalence of 2.1% (13 of 629) among patients receiving a plastic biliary stent and 4.3% (13 of

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304) among those stented for a perihilar stricture; all had stents of 12 cm or more, the median interval was 12 days, and mortality was 4 of 13 (31%) [7]. Perforation may occur within 24 hours of insertion [21] or two months later [22], may be repaired endoscopically with clips [23,24], and may present far downstream as small-bowel [25] or sigmoid perforation requiring Hartmann's procedure [26]. Pooled published perforation cases number 78, of which 93.6% involved plastic stents, 44.9% (35 of 78) were duodenal, 60.3% (47 of 78) were managed surgically and 34.6% (27 of 78) endoscopically, with eight deaths; the mortality denominator is stated inconsistently in the source and is reported here as eight deaths among the pooled cases [8].

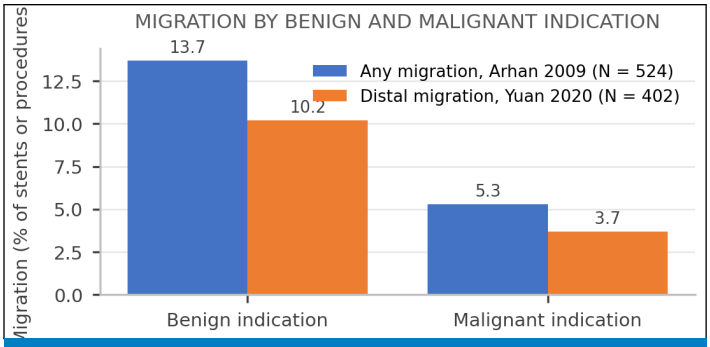

Figure 2: Migration is consistently commoner with benign than with malignant indications, whether counted as any migration or as distal migration alone (N = 524 procedures and N = 402 procedures) [2,5].

Retrieval and Management of the Migrated Stent

Most distally migrated stents need nothing. The majority pass through the intestine without any problem, endoscopic retrieval is usually possible, and surgery is rarely necessary [6]. In the benign cohort, distal migrations were mostly asymptomatic and mostly passed spontaneously, while proximal migrations were mostly symptomatic, with cholangitis in 39% [4]. Across three referral centres, all 21 proximal migrations were symptomatic against 17 of 30 (56.7%) distal ones [27].

Retrieval succeeds in most hands. Proximally migrated straight stents were retrieved endoscopically in 70 of 74 (94.59%), most often with a balloon catheter (46 of 74), with complications in 2.7% and failure confined to impacted stents and stents lying above the stricture [10]. All 13 proximally migrated stents in the benign cohort were retrieved, 10 at the first session [4], and all proximally migrated stents were retrieved in a further 45 migrations among 34 patients [2], as were all retained migrated stents among 74 migrations in 876 patients [3]. Success is not uniform: 15 of 21 (71.4%) proximal retrievals succeeded across three referral centres [27]. All 25 distally migrated stents in one cohort were retrieved endoscopically with no surgery [5]. Where the outlet itself is obstructed, access rather than grasping is the difficulty, and the reported solutions have been to create or use a bypass conduit [15,16] or to stent the duodenal obstruction [14].

The Missing Denominator

The asymmetry between the two halves of this review is the finding. Migration is quantified across five cohorts totalling several thousand stents; duodenal perforation is quantified in a consecutive series with an explicit denominator [7]; but gastric outlet obstruction is represented by three case reports, in none of which the stent is clearly the obstructing object. The pooled perforation literature tabulates sites of perforation and not sites of obstruction [8], and the standard complication classification of penetration, perforation and obstruction does not separate gastroduodenal from more distal obstruction [6]. Case reporting is also incomplete in a specific and correctable way: the one clean report of a stent lying free in an obstructed stomach was published in Korean [13], and non-English case literature is the most likely place where further examples are held.

The practical reading is modest. A patient who vomits after biliary stenting should be imaged, and the differential includes both a displaced stent and progression of the tumour that the stent was placed for; in the published outlet cases these two coexisted. The stent should be sought wherever it has gone, since it has been found in the stomach, the duodenum, the jejunum, the

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ileum and the sigmoid.

Conclusion

Biliary stent migration is common, well counted and usually benign in consequence. Gastric outlet obstruction attributed to a migrated stent is, on the published record examined here, three case reports in which tumour narrowed the duodenum in every instance, plus mechanistic inference from impaction and perforation cases at other sites. There is no denominator, and none should be invented. Until non-English case literature is systematically searched and outlet obstruction is separated from other luminal obstruction in complication classifications, the honest statement remains that this complication is reported and unmeasured.

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