

LETTERS TO THE EDITOR

© 2022 EDIZIONI MINERVA MEDICA
Online version at <https://www.minervamedica.it>
Minerva Surgery 2022 Dec 07
DOI: 10.23736/S2724-5691.22.09791-X

Comparison between plastic stent (PS) and self-expandable-metallic stent (SEMS) for preoperative biliary drainage: which one fits best for resectable pancreatic lesions? Data analysis of a referral center for biliopancreatic disease treatment and literature overview

Restoring the patency of the biliary tree is of paramount importance in case of malignant obstructive jaundice due to pancreatic cancer, especially in those patients with a potentially resectable neoplasm.^{1,2} Current techniques of drainage include surgical bypass, percutaneous transhepatic drainage, endoscopic retrograde chol-

angiopancreatography (ERCP) or endoscopic-ultrasound guided drainage.¹⁻³ Even if a full agreement still lacks, most of authors still consider ERCP plus plastic or self-expandable-metallic stent (SEMS) placement as the best choice for preoperative drainage.^{4,5} Till now, plastic stents (PS) have been traditionally adopted for this purpose, but recent literature data tend to emphasize the superiority of SEMS as compared to PS, especially in patients referred to neoadjuvant therapy.^{3,4} The aim of our article was to compare endoscopic PS and SEMS-placement in 28 patients with resectable pancreatic neoplasms treated at our hospital from June 2016 and May 2022, reporting their impact on ERCP- and surgery-related outcomes. Once achieved biliary cannulation and endoscopic sphincterotomy, length and exact site of the common bile duct (CBD) stricture were assessed through an occlusion cholangiography. Biliary stenting was performed placing either a fully covered SEMS (10 mm in diameter, 60 mm in length) or a plastic stent (10 Fr-70 mm in length or 8.5 Fr-70 mm in length), according to CBD stenosis and features of the neoplasm (Figure 1). SEMS placement was preferentially chosen in case of estimated long time to surgery (more than 6 weeks), some indications to neoadjuvant chemotherapy or suspicious of inoperable disease. Patients underwent either a Whipple's pancreaticoduodenectomy or a py-

Figure 1.—Preoperative drainage by PS or SEMS. A) Endoscopic view of a PS across the ampullary orifice. B) Fluoroscopic view showing the effective PS-placement at the level of the stricture (circle). C) Endoscopic appearance of a SEMS, showing the distal portion opening into the duodenum. D) SEMS appearance at the fluoroscopic image (circle).

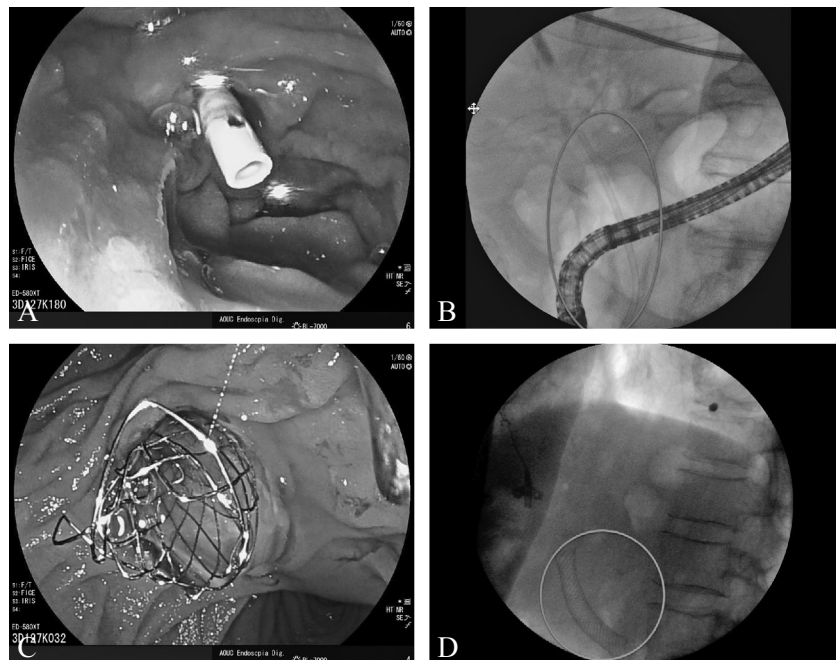


TABLE I.—Study population.

Characteristics	Plastic stent	Metallic stent	Overall	P value
Number of lesions, N.	13	15	28	
Age (years), median [IQR]	77.00 [73.00, 78.00]	76.00 [65.00, 83.00]	76.50 [72.00, 81.00]	0.800
Sex, N.				1.000
Male	8	9	17	
Female	5	6	11	
CBD diameter (mm), median [IQR]	16.00 [14.00, 22.00]	22.00 [18.00, 25.00]	19.50 [14.75, 25.00]	0.258
Tumor site, N. (%)				0.150
Pancreas	7 (53.85)	12 (80.00)	19 (67.86)	
CBD	4 (30.77)	2 (13.33)	6 (21.43)	
Duodenal papilla	2 (15.38)	0 (0.00)	2 (7.14)	
Duodenum	0 (0.00)	1 (6.67)	1 (3.57)	
Final diagnosis, N. (%)				0.267
Pancreatic adenocarcinoma	7 (53.85)	12 (80.00)	19 (67.86)	
CBD carcinoma	3 (23.08)	2 (13.33)	5 (17.86)	
Pancreatic carcinoma	2 (15.38)	0 (0.00)	2 (7.14)	
Duodenal carcinoma	0 (0.00)	1 (6.67)	1 (3.57)	
Stromal tumor	1 (7.69)	0 (0.00)	1 (3.57)	

lorus-preserving pancreaticoduodenectomy (also called Traverso-Longmire's procedure) with standard lymphadenectomy; surgical approach was either a robotic-assisted minimally invasive or a standard laparotomic incision method. Primary endpoint was considered as a decrease in serum bilirubin level more than 50% in the following 7 days, without any need for stent exchange before surgery. Secondary endpoints included ERCP-related adverse events collection (pancreatitis, bleeding, cholangitis, perforation) and surgery-related complications (biliary leak, pancreatic leak, bleeding, surgical site infection, pneumonia, atrial fibrillation, sepsis). Technical success was considered as a proper stent placement across the obstruction, whereas clinical success was defined as R0 resection (both deep and lateral negative margins at the pathological examination). Statistical analysis was performed using the R-software (R Foundation, Vienna, Austria; version 4.1.2). Continuous variables were reported as median and interquartile range (IQR). The presence of association between stents features and clinical outcomes was evaluated by χ^2 and Fisher's Exact Test, when appropriate. Comparison between medians was performed using the Wilcoxon Rank-Sum Test. Follow-up time after surgery was evaluated by Kaplan-Meier method and compared with the log-rank test. Estimates of Odds Ratios (OR) and their 95% confidence interval (CI) were calculated with the logistic regression model. A two-sided $P \leq 0.05$ was considered significant. Patients were equally distributed between the two cohorts (13 PS vs. 15 SEMS); median CBD diameter was 19.50 mm (IQR: 14.75-25.00); pancreatic adenocarcinoma resulted as the most represented histology (Table I). Statistical analysis confirmed that recurrent biliary obstruction rate was significantly lower in the SEMS-group (OR=0.00, 95% CI: 0.00-0.55; $P=0.005$), since the 6 patients experiencing stent replacement had a previous PS. In these patients, once achieved PS removal, a SEMS was placed. Overall, almost all of articles published tend to support the lower

incidence of premature stent occlusion observed with SEMS, thus reducing stent revision rate and resulting more cost-effective³⁻⁵ (Figure 2). This observation reaffirms Ichikawa *et al.*'s outcomes, in which the main advantage of SEMS was the lower stent occlusion rate, whereas PS placement was associated to a shorter surgical time and length of stay after surgery ($P < 0.01$).⁴ According to univariable statistical data analysis, post-ERCP hospital stay was significantly shorter in the plastic-stent group (OR=1.63, 95% CI: 1.08-2.96; $P=0.011$). On average, the odds of SEMS increased by 63% for



Figure 2.—Obstructed plastic stent as appears once removed by ERCP.

TABLE II.—*ERCP-related outcomes.*

ERCP-related results	Plastic stent	Metallic stent	Overall	P value
Number of lesions, N.	13	15	28	
Involuntary main pancreatic duct cannulation, N. (%)	5 (38.46)	2 (13.33)	7 (25.00)	0.198
Procedure time (minutes), median [IQR]	35.00 [30.00, 45.00]	45.00 [33.50, 53.50]	38.00 [31.50, 53.25]	0.356
Hospital stay (days), median [IQR]	3.00 [2.00, 3.00]	4.00 [3.00, 6.00]	3.00 [2.50, 6.00]	0.011
Complications, N. (%)	5 (38.46)	3 (20.00)	8 (28.57)	0.410
Decrease in bilirubin level (mg/dL), median [IQR]	7.20 [1.50, 9.90]	7.60 [6.50, 11.85]	7.55 [6.38, 10.65]	0.289
Recurrent biliary obstruction, N. (%)	6 (46.15)	0 (0.00)	6 (21.43)	0.005

TABLE III.—*Surgery-related outcomes.*

Surgery-related results	Plastic stent	Metallic stent	Overall	P value
Number of lesions, N.	13	15	28	
Type of reconstruction, N. (%)				0.700
Whipple	6 (46.15)	5 (33.33)	11 (39.29)	
Traverso-Longmire	7 (53.85)	10 (66.67)	17 (60.71)	
Surgical access, N. (%)				0.087
Laparotomic	10 (76.92)	15 (100.00)	25 (89.29)	
Robotic-assisted minimally invasive	3 (23.08)	0 (0.00)	3 (10.71)	
Procedure time (minutes), median [IQR]	420.00 [360.00, 480.00]	360.00 [310.00, 392.50]	379.00 [318.75, 422.50]	0.083
Hospital stay (days), median [IQR]	12.00 [10.00, 20.00]	15.00 [9.00, 21.50]	14.50 [9.50, 21.25]	0.817
Complications, N. (%)	7 (53.85)	7 (46.67)	14 (50.00)	1.000
Survival after surgery (days), median [IQR]	382.00 [186.00, 628.00]	382.00 [265.50, 485.00]	382.00 [185.50, 527.25]	0.782

each day of post-ERCP hospital stay (OR=1.63, 95% CI: 1.08-2.96; P=0.049). As for surgery-related outcomes, univariable analysis did not reveal any significant difference between the two cohorts, except for surgical access, which tended to be more likely minimally invasive in the plastic stent-group, even if no statistically significant difference emerged (OR=0.00, 95% CI: 0.00-1.98; P=0.087). This fact could be related to the fibrosis and inflammation caused by the metallic stent around the CBD, increasing the difficulty experienced by surgeons during the minimally invasive robotic resection. Data regarding ERCP-related results and surgery-related outcomes are summarized in Table II, III, respectively. The median follow-up time, estimated with Kaplan-Meier curve, was exactly the same in the two groups (382 days). Log-rank test for follow up did not reveal any statistically significant difference between PS and SEMS-group (P=0.782) (Figure 3). This datum, still confirming Ichikawa's paper, may be affected by the small sample size of our single-arm retrospective study.^{4, 5} To date, it is still controversial the ideal stent selection in case of biliary decompression preceding pancreatic resection, since both types of stent offer advantages and disadvantages. In 2010, Decker *et al.* published a retrospective study underlining the superiority of metallic stent to PS in terms of lower recurrent biliary obstruction rate, without a higher ERCP-related complications rate.³ Despite the small number of enrolled patients, authors conclude that SEMS are an optimal tool both in case of resectable lesions and for palliative purpose.³ Four years later, a well-organized manuscript by Haapamäki *et al.* suggested that PS do not differ significantly from SEMS concerning recurrent obstruction

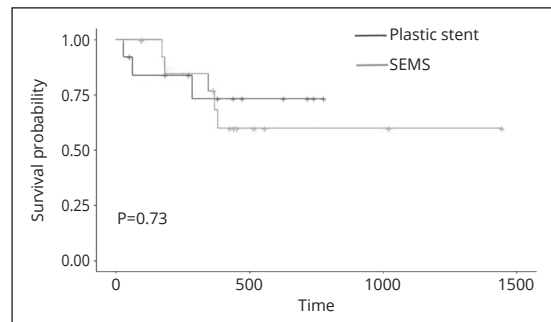


Figure 3.—Kaplan-Meier curve of follow-up time after surgery of plastic stent and SEMS-group. Log-rank test did not reveal a statistically significant P value between the two groups (P=0.782).

rate, bilirubin level decrease or postoperative complications rate.¹ Moreover, authors did not find evidence supporting the role of SEMS over PS for bilirubin level decrease and longer patency, suggesting, on the other hand, PS placement whenever survival is expected less than 6 months.¹ In conclusion, to date there is not full agreement about which stent (plastic or metallic) fits best for preoperative biliary drainage.^{1, 3, 5} Considering our experience and literature data overview, we suggest plastic stent in case of short time lapse to surgery, no indications to neoadjuvant therapy and no suspect for inoperable disease; in all other cases, literature more and more emphasize SEMS use.^{4, 5}

Damiano BISOGNI¹ *

Luca TALAMUCCI ¹, Roberto MANETTI ¹,
Michele ROSSI ¹, Fabio STADERINI ²,
Lorenzo RIGHI ³, Fabio CIANCHI ²

¹Unit of Interventional Endoscopy, Department
of Oncology and Robotic Surgery, AOU Careggi,
Florence, Italy; ²Unit of Gastrointestinal Surgery,
Department of Surgery, AOU Careggi, Florence, Italy;
³Clinical Trial Center (CTC), AOU Careggi, Florence,
Italy

*Corresponding author: Damiano Bisogni, Unit of Interventional
Endoscopy, Department of Oncology and Robotic Surgery,
AOU Careggi, Largo Brambilla, 50134 Florence, Italy.
E-mail: bisognifelice@libero.it

References

1. Haapamäki C, Seppänen H, Udd M, Juuti A, Halttunen J, Kiviluoto T, *et al.* Preoperative biliary decompression preceding pancreaticoduodenectomy with plastic or self-expandable metallic stent. *Scand J Surg* 2015;104:79–85.
2. Togawa O, Isayama H, Kawakami H, Nakai Y, Mohri D, Hamada T, *et al.* Preoperative biliary drainage using a fully covered self-expandable metallic stent for pancreatic head cancer: A prospective feasibility study. *Saudi J Gastroenterol* 2018;24:151–6.
3. Decker C, Christein JD, Phadnis MA, Wilcox CM, Varada-

rajulu S. Biliary metal stents are superior to plastic stents for preoperative biliary decompression in pancreatic cancer. *Surg Endosc* 2011;25:2364–7.

4. Ichikawa H, Iwashita T, Iwasa Y, Uemura S, Tezuka R, Okuno M, *et al.* Covered self-expandable metallic stent versus plastic stent for preoperative endoscopic biliary drainage in patients with pancreatic cancer: a multi-center retrospective cohort study. *Scand J Gastroenterol* 2022;57:493–500.

5. Tamura T, Itonaga M, Ashida R, Yamashita Y, Hatamaru K, Kawaji Y, *et al.* Covered self-expandable metal stents versus plastic stents for preoperative biliary drainage in patient receiving neo-adjuvant chemotherapy for borderline resectable pancreatic cancer: prospective randomized study. *Dig Endosc* 2021;33:1170–8.

Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Authors' contributions.—All authors read and approved the final version of the manuscript.

History.—Article first published online: December 7, 2022. - Manuscript accepted: November 15, 2022. - Manuscript received: October 23, 2022.

(Cite this article as: Bisogni D, Talamucci L, Manetti R, Rossi M, Staderini F, Righi L, *et al.* Comparison between plastic stent (PS) and self-expandable-metallic stent (SEMS) for preoperative biliary drainage: which one fits best for resectable pancreatic lesions? Data analysis of a referral center for biliopancreatic disease treatment and literature overview. *Minerva Surg* 2022 Dec 07. DOI: 10.23736/S2724-5691.22.09791-X)