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Metal versus Plastic Stent for Transmural Drainage of Pancreatic Fluid Collections

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The conventional management of pancreatic fluid collections (PFCs) involves surgery or percutaneous drainage. While surgery is associated with significant complications and mortality, percutaneous drainage is associated with prolonged hospitalization and oftentimes the need for other adjunctive treatment measures. Therefore, the use of endoscopy to drain PFCs is becoming increasingly popular. Randomized trials have demonstrated that endoscopic ultrasound-guided drainage is superior to conventional endoscopy in terms of technical success and potentially decreases the rates of procedural complications. While transmural drainage is usually undertaken by deployment of plastic endoprosthesis, of late, fully covered self-expandable metal stents are being placed with increasing frequency. However, the benefits of this approach are unclear and require further validation in prospective trials.

Key Words: Pancreatic pseudocyst; Metal stents; Plastic stents; Endoscopic ultrasound-guided pseudocyst drainage; Endoscopic drainage

INTRODUCTION

Endoscopic treatment outcomes are directly related to the type of pancreatic fluid collection (PFC) being treated; while the treatment success for pancreatic pseudocysts is greater than 90%, it is at best 50% to 65% for walled-off pancreatic necrosis (WOPN).¹ As the density of the cystic fluid is low, endoscopic drainage of pancreatic pseudocysts can be accomplished by placement of a few transmural plastic stents through one fistulous tract. On the other hand, necrotic contents are highly dense and hence require a larger fistulous opening or multiple tracts for effective drainage, with ineffective drainage oftentimes resulting in infection. Also, the WOPN may extend deep into the abdominal flanks or can be multiloculated requiring adjunctive measures such as percutaneous or surgical drainage.

Pseudocyst drainage

In a recent study of 117 patients with pancreatic pseudocysts, the overall treatment success was 98.3% (115/117 patients): 102 (87.2%) patients required one intervention, 13 (11.1%) required >1 intervention and two (1.7%) failed treatment.² There was no difference in the median number of interventions required for treatment success between patients with 7 or 10 Fr stents and between patients with 1 or >1 stent. On multivariate analysis, the size and number of stents were not associated with the number of interventions required for treatment success when adjusted for pseudocyst size, drainage modality, presence or absence of pancreatic duct stent placement, luminal compression, and location of the pseudocyst. A recent study on the use of a lumen-apposing novel metal stent for pseudocyst drainage in 15 patients demonstrated clinical outcomes similar to plastic stents: treatment success in all patients and one case of stent migration.³ In all studies, whether the endoprosthesis was plastic or metal, the stents were removed within 3 months following the resolution of the pseudocyst.^{2,3} The important question is: what are the added advantages to placing fully covered self-expandable metal stent (FCSEMS)? FCSEMS are easier to deploy and preclude the need to place multiple plastic stents, which can be technically challenging. However, for pseudocysts (not WOPN), placement of one or two plastic stents may be sufficient to facilitate

Received: May 8, 2013 Revised: June 30, 2013

Accepted: July 17, 2013

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effective drainage of cyst contents. Also, plastic stents are significantly cheaper than FCSEMS. Therefore, while technically feasible, current evidence does not support a role for FCSEMS in patients with uncomplicated pancreatic pseudocysts. The results of selected studies examining the treatment outcomes in patients undergoing PFC drainage using plastic and metal stents are summarized in Tables 1, 2.¹⁻¹²

WOPN drainage

There are two issues that are central to treatment outcomes: 1) extent of necrosis and 2) integrity of the main pancreatic duct. If the WOPN extends deeper into the flanks, patients will require a hybrid drainage that combines endoscopy with laparoscopy or percutaneous catheter placement to facilitate better irrigation, drainage and removal of the necrotic contents. On the other hand, if there is only one large necrotic cavity adjacent to the stomach or the duodenum, endoscopic transmural drainage alone is sufficient. While WOPN measuring <10 to 12 cm can be treated successfully with placement of multiple transluminal stents and a nasocystic drainage catheter through one transmural tract, WOPN measuring more than 12 cm benefit from more aggressive drainage via the multiple transluminal gateway technique (MTGT). This

involves creating multiple conduits into the gut lumen for effective drainage of the necrotic contents (along with nasocystic catheter placement).¹³ In either scenario, if the stents are to be removed within 2 months, there is no difference in outcomes between placing a FCSEMS or multiple plastic stents (single plastic stents should not be placed in WOPN). Additionally, if treatment is undertaken using the MTGT approach, placement of FCSEMS at multiple sites may not be cost effective (Tables 1, 2).

In patients with an intact main pancreatic duct, once WOPN resolves, the transluminal stents need to be removed. In patients with a disconnected pancreatic duct syndrome, preliminary evidence suggests that indwelling permanent stents decrease the rates of PFC recurrence.¹⁴ The role of FCSEMS in such a scenario appears logical. The critical question is: can FCSEMS be left permanently? None of the current studies have addressed this important question.^{10,12} There is legitimate concern that once the WOPN resolves, the SEMS may migrate within the cavity and may be impossible to retrieve. Also, as the WOPN resolves, the SEMS may corrode the wall of the cavity and induce bleeding. Given these limitations, SEMS are not being placed on a permanent basis in patients with any type of PFC, including WOPN.

Table 1. A Summary of Selected Studies Using Plastic Stents for Drainage of Pancreatic Fluid Collections

Study	Pseudocysts			WOPN		
	Total no. of pancreatic fluid collections	Treatment success (%)	Complications (%)	Total no. of pancreatic fluid collections	Treatment success (%)	Complications (%)
Varadarajulu et al. (2011) ¹	154	144 (94)	8 (5)	57	36 (63)	9 (16)
Bang et al. (2013) ²	117	115 (98)	-	-	-	-
Sadik et al. (2011) ⁴	26	23 (88)	4 (15)	-	-	-
Gluck et al. (2010) ⁵	-	-	-	22	22 (100)	2 (9)
Bang et al. (2013) ⁶	-	-	-	76	53 (70)	-
Seewald et al. (2012) ^{7, a)}	80	67 (84)	21 (26)	a)	a)	a)

Values are presented as number (%).

WOPN, walled-off pancreatic necrosis.

^{a)}Results are for both pseudocysts and WOPN as no subgroup analysis was performed according to pancreatic fluid collection type.

Table 2. A Summary of Selected Studies Using Metal Stents for Drainage of Pancreatic Fluid Collections

Study	Pseudocysts			WOPN		
	Total no. of pancreatic fluid collections	Treatment success (%)	Complications (%)	Total no. of pancreatic fluid collections	Treatment success (%)	Complications (%)
Belle et al. (2010) ⁸	-	-	-	4	4 (100)	1 (25)
Berzosa et al. (2012) ⁹	6	5 (83)	0 (0)	4	4 (100)	0 (0)
Itoi et al. (2012) ³	15	15 (100)	1 (7)	-	-	-
Fabbri et al. (2012) ¹⁰	20	17 (85)	3 (15)	-	-	-
Penn et al. (2012) ¹¹	20	17 (85)	3 (15)	-	-	-
Weilert et al. (2012) ¹²	18	14 (78)	6 (33)	-	-	-

Values are presented as number (%).

WOPN, walled-off pancreatic necrosis.

CONCLUSIONS

While current evidence suggests that placement of metal stents is technically feasible in patients with PFCs, there is no data to prove that metal stents are superior to plastic stents in terms of treatment efficacy, complications, recurrence rates or cost-effectiveness. Randomized trials with long-term follow-up are required to compare metal and plastic stents for drainage of PFCs.

Conflicts of Interest

The authors have no financial conflicts of interest.

REFERENCES

1. Varadarajulu S, Bang JY, Phadnis MA, Christein JD, Wilcox CM. Endoscopic transmural drainage of peripancreatic fluid collections: outcomes and predictors of treatment success in 211 consecutive patients. *J Gastrointest Surg* 2011;15:2080-2088.
2. Bang JY, Wilcox CM, Trevino JM, Ramesh J, Varadarajulu S. Relationship between stent characteristics and treatment outcomes in endoscopic transmural drainage of pancreatic pseudocysts. *Gastrointest Endosc* 2013;77(5 Suppl):AB382.
3. Itoi T, Binmoeller KF, Shah J, et al. Clinical evaluation of a novel lumen-apposing metal stent for endosonography-guided pancreatic pseudocyst and gallbladder drainage (with videos). *Gastrointest Endosc* 2012;75:870-876.
4. Sadik R, Kalaitzakis E, Thune A, Hansen J, Jönson C. EUS-guided drainage is more successful in pancreatic pseudocysts compared with abscesses. *World J Gastroenterol* 2011;17:499-505.
5. Gluck M, Ross A, Irani S, et al. Endoscopic and percutaneous drainage of symptomatic walled-off pancreatic necrosis reduces hospital stay and radiographic resources. *Clin Gastroenterol Hepatol* 2010;8:1083-1088.
6. Bang JY, Wilcox CM, Trevino J, et al. Factors impacting treatment outcomes in the endoscopic management of walled-off pancreatic necrosis. *J Gastroenterol Hepatol*. Epub 2013 Jul 5. DOI: <http://dx.doi.org/10.1111/jgh.12328>.
7. Seewald S, Ang TL, Richter H, et al. Long-term results after endoscopic drainage and necrosectomy of symptomatic pancreatic fluid collections. *Dig Endosc* 2012;24:36-41.
8. Belle S, Collet P, Post S, Kaehler G. Temporary cystogastrostomy with self-expanding metallic stents for pancreatic necrosis. *Endoscopy* 2010;42:493-495.
9. Berzosa M, Maheshwari S, Patel KK, Shaib YH. Single-step endoscopic ultrasonography-guided drainage of peripancreatic fluid collections with a single self-expandable metal stent and standard linear echoendoscope. *Endoscopy* 2012;44:543-547.
10. Fabbri C, Luigiano C, Cennamo V, et al. Endoscopic ultrasound-guided transmural drainage of infected pancreatic fluid collections with placement of covered self-expanding metal stents: a case series. *Endoscopy* 2012;44:429-433.
11. Penn DE, Draganov PV, Wagh MS, Forsmark CE, Gupte AR, Chauhan SS. Prospective evaluation of the use of fully covered self-expanding metal stents for EUS-guided transmural drainage of pancreatic pseudocysts. *Gastrointest Endosc* 2012;76:679-684.
12. Weilert F, Binmoeller KF, Shah JN, Bhat YM, Kane S. Endoscopic ultrasound-guided drainage of pancreatic fluid collections with indeterminate adherence using temporary covered metal stents. *Endoscopy* 2012;44:780-783.
13. Varadarajulu S, Phadnis MA, Christein JD, Wilcox CM. Multiple transluminal gateway technique for EUS-guided drainage of symptomatic walled-off pancreatic necrosis. *Gastrointest Endosc* 2011;74:74-80.
14. Varadarajulu S, Wilcox CM. Endoscopic placement of permanent indwelling transmural stents in disconnected pancreatic duct syndrome: does benefit outweigh the risks? *Gastrointest Endosc* 2011;74:1408-1412.