Retrieval of Proximally Migrated Pancreatic Stents

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Abstract

Proximal migration of pancreatic stents (PS) represent a challenging situation and surgical retrieval is needed in 10% of patients. The endoscopic extraction retrieval is hindered by the lack of dedicated devices, and the usual endoscopic retrograde cholangiopancreatography material is used. Experience of the endoscopist is also important and can lead to a successful retrieval. In this article, different techniques of proximally migrated pancreatic stent retrieval are described and the endoscopic results of stent extraction are discussed, along with a demonstrative video showing different extraction techniques. This article is part of an expert video encyclopedia.

Keywords

Cholangiopancreatography; Endoscopic retrograde cholangiopancreatography; Endoscopic retrograde; Endoscopy; Pancreas; Stents; Video.

Introduction

Proximal migration has been described in 5.2% of patients with pancreatic stents (PS), although distal migration occurs in 7.5%. Proximally migrated PS represent a challenging situation, because all retrieval techniques were developed for the extraction of migrated biliary stents. The bile duct has a larger caliber which allows performing extraction maneuvers without difficulty. But in the pancreatic duct, this is not always possible, given that its size does not usually allow the introduction or manipulation of the required accessories. For this reason, other rescue techniques have been tested, such as use of material generally utilized for cardiac catheterization, in many cases with success. The two-dimensional radioscopy used for this approach requires a skillful endoscopist. The pancreatic duct caliber and risk of pancreatitis after pancreatic duct manipulation forces the endoscopist to perform a careful and deliberately atraumatic removal of PS, to avoid irritation along the pancreatic duct or at the orifice area as the stent is withdrawn. With regard to this, chronic pancreatitis allows the performance of more aggressive extraction techniques than healthy pancreatic tissue, because it entails a dilated duct and also a lower risk of complication.

In a retrospective series including 26 proximally migrated PS, endoscopic retrieval was successful in 80% of cases, whereas 10% were left in situ without clinical manifestations, and the remaining 10% required surgery for removal. In another recent series of endoscopic removal, the retrieval rate was similar (78%), surgery was performed in 17%, and observation without removal of the stent in 5%. The complication rate related to the extraction procedure was 13%: 1 case of pancreatitis, 1 case of stent fragmentation, and 1 case of pancreatic duct disruption.

Technique

Many extraction techniques have been proposed, but in the vast majority of the reported cases, removal was achieved either using a Dormia basket to seize the stent or by gently pulling a proximally or adjacently placed Fogarty balloon, thus dragging the stent. In the series by Price et al., including 23 endoscopically placed proximally migrated PS, the most common removal technique was balloon extraction (8 of 18; 44%). The rest of the stents were retrieved using direct forceps grasp (28%) and the Lasso technique (11%). The majority of these procedures involved replacement of the transpapillary pancreatic stent after manipulating the duct (15 of 22; 68%). In this series, failure of endoscopic extraction was related to the presence of downstream stenoses that hindered it. The more commonly used techniques can be summarized as follows:

Indirect grasping technique. With the indirect grasping technique, common devices such as foreign-body forceps, Dormia baskets, or polypectomy snares must be inserted into the pancreatic duct through the papilla, advanced to the distal end of the stent, and then maneuvered to grasp and pull down the PS. The procedure is then most commonly completed by grasping the PS with a forceps, although some authors prefer using a snare or basket to retrieve the migrated stents.

Lasso technique. The Lasso technique can be very useful to retrieve proximally migrated PS. cannulation of the pancreatic duct must be achieved first, to leave a guidewire running...
through or alongside the migrated stent. A polypectomy snare
is then threaded over the guidewire and inserted gently into
the pancreatic duct along it avoiding trauma to the ampulla or
pancreatic duct in this manner. Once the snare is at the level of
the distal end of the stent, it is opened and manipulated to
enclose the stent and retrieve it. This technique was originally
described by Sherman et al.,6 and required cannulation of the
stent with a guidewire, but recent experiences using variations
of this technique such as cannulating the duct alongside the
stent instead of through the stent lumen have been reported.7
The main advantage of the Lasso technique is that it preserves
access to the pancreatic duct, avoiding the need for recannu-
lation to review the duct or insert a new stent over the
guidewire. This is especially useful when difficult cannulation
is anticipated. In our experience, the Lasso technique has
proved both helpful and easy to perform, allowing us to re-
cover proximally migrated stents in a high proportion of cases.

Fogarty balloon technique. Extraction of proximally mi-
grated biliary stents with a Fogarty or a dilating balloon has
been successfully accomplished, but its role in retrieving mi-
grated PS is minor, especially in nondilated pancreatic ducts,
because the caliber of the duct does not allow the insertion
of the balloon alongside the PS. If the balloon can be at
least partially inserted along the PS, it may be partly inflated
and gradually pulled down, pushing the stent out of the
pancreatic tract.

The use of new devices such as SpyGlass (Boston Scientific,
Natick, MA, USA) has also been successfully applied in pan-
creatic stent removal, as two recently reported cases demon-
strated.8,9 In both cases, the previously described methods
have failed. In one of them, the SpyGlass system was intro-
duced into the pancreatic duct and advanced until the mi-
grated stent came into view. At that point, the SpyForceps
(Boston Scientific, Natick, MA, USA) was employed to seize
and remove the stent.9 In the other case, the SpyGlass allowed
visualization of the distal end of the stent and cannulation of
its lumen with a guidewire. Subsequently, the SpyGlass system
was removed and the stent was retrieved with a Soehendra
stent retriever.9 Regarding this technique, it must be previously
ensured that the pancreatic duct diameter is sufficient to tol-
erate the Spyglass system insertion.

Other methods of retrieval have been described, such as
using a guidewire to straighten the pancreatic duct before
graping the migrated stent with a forceps.10

Materials

Retrieval of proximally migrated PS is commonly performed
using the accessories available in our endoscopy unit for other
purposes. The materials used to extract a migrated pancreatic
stent should be simple, effective, and inexpensive. Thus, many
authors recommend starting the extraction efforts with a
Fogarty balloon, attempting the polyp snare or the over-the-
guidewire stone basket grasp techniques if the first approach
fails.4 If possible, cannulation of the stent facilitates removal
although this is not easily accomplished. Difficult cases with
downstream stenoses require a series of ductal balloon dilata-
tions before retrieval. Final attempts in the series by Price
et al.4 were performed with direct forceps grasp.

In proximally migrated stents, we start with the Lasso
technique, followed by an indirect grasping technique in case
of failure. The use of intraductal devices such as SpyGlass,
if allowed by the pancreatic duct diameter, is a promising
alternative that warrants further study.

Endoscopic Procedure

Proximally migrated stents represent a therapeutic challenge
for endoscopists as previously stated. Thus, in our opinion,
the procedure should be performed by an experienced en-
doscopist. Normally, migration of the stent remains unnoticed
until a scheduled endoscopic retrograde cholangiopancreato-
graphy (ERCP) is performed to change a previously placed
stent. It is advisable to use an optimal fluoroscopy setup, as
plastic PS are difficult to identify on X-ray, especially 5 Fr
caliber or thinner stents. The procedure must start by cannu-
lating the pancreatic duct and inserting a guidewire into the
caudal portion of the duct. Pancreatic sphincterotomy or
sphincteroplasty usually facilitates the extraction procedure.
Different factors must be taken into account, such as the
caliber of the stent in relation to the caliber of the pancreatic
duct, the position of the distal end of the stent (the end closer
to the endoscope), and the pancreatic disease that affects the
patient.

Caliber of the stent and duct. If the caliber of the stent is
adjusted to the caliber of the duct, the Lasso technique should
be accomplished without difficulty, because cannulation of
the stent lumen becomes easier. When the stent floats in a
wide duct, the use of devices that allow performance of in-
direct grasping (Fogarty balloon, foreign-body forceps, etc.)
facilitates the retrieval.

Migration of the stent proximally to pancreatic duct stric-
tures hinders the extraction procedure and dilation of the
stricture is usually necessary to retrieve the stent.

Position of the distal end of the stent. It is not unusual,
especially in patients with chronic pancreatitis and dilated
pancreatic branches, that the distal (duodenal) end of the
stent becomes inserted into a secondary branch after migra-
tion. If this happens, the retrieval procedure is enormously
hindered and, in our experience, retrieval efforts should be
started by using a foreign-body forceps or a tripod. If indirect
graping attempts fail, virtually only two options are left. The
first one would be to perform the extraction with the aid of a
pancreatoscopy device such as SpyGlass, and the other to re-
trieve the stent by grasping its proximal end with a Dormia
basket. In this latter option, the extraction procedure must be
extremely careful, for the distal end of the stent will remain
trapped in the secondary branch until the operation is com-
pleted, forcing the stent to fold over itself within the pan-
creatic duct as it is pulled out. We recommend this approach
only in patients with advanced chronic pancreatitis.

Pancreatic disease of the patient. Patients with a normal
pancreas in whom a prophylactic stent placed during ERCP to
avoid postprocedure pancreatitis migrates into the pancreatic
duct probably represents the most risky situation for retrieval.
These patients usually have a normal pancreas with a thin
duct, and the retrieval process must be extremely gentle and
careful to avoid further complications.
Tips and Tricks

Experience in retrieving proximally migrated biliary stents is desirable before attempting pancreatic stent retrieval. Stents migrated into the biliary tract are usually more easily extracted as the extrahepatic bile duct lacks secondary branches, and its wall is composed of dense collagenous tissue harboring scattered smooth muscular elements, and thus, is more resistant to trauma. Furthermore, the diameter of the bile duct is usually far wider than the pancreatic duct.

We recommend working always with a guidewire deeply inserted in the pancreatic duct, for even if the devices we use cannot be introduced over the wire, it will help us identify the pancreatic duct in fluoroscopy.

It is recommended to perform pancreatic sphincterotomy or sphincteroplasty for biliary stent retrieval, and in our opinion, it is also useful to extract pancreatic migrated stents. Another important thing to take into account is that we should try to use only over-the-wire devices. In case of Dormia baskets, it is better to use an over-the-wire basket but with free tip to be opened alongside the guidewire.

In a normal pancreas with a narrow duct, pediatric devices such as a pediatric tripod can be useful. Finally, if extraction attempts are unsuccessful, insertion of a second stent can be performed and a subsequent ERCP is scheduled after six to eight weeks. Extraction of the second stent may drag the migrated stent externally.

Complications and Risk Factors

In the retrospective series by Price et al., complications related to the extraction procedure occurred in 13% of the cases, including 1 case of pancreatitis, 1 case of stent fragmentation, and 1 case of pancreatic duct disruption.

Moffatt et al. described a postprocedure pancreatitis rate of 3% in a series of endoscopic removal of 230 retained post-ERCP prophylactic PS, although these were not really migrated stents.

Alternatives

As can be seen by previously cited series, two options can be considered as alternatives to endoscopic stent retrieval: Surgery, which can be necessary in 10–17% of patients; and conservative management, which was the preferred option in 5–10% of patients.

Scripted Voiceover

<table>
<thead>
<tr>
<th>Time (min:sec)</th>
<th>Voiceover text</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:01</td>
<td>In our experience, the Lasso technique is very useful to retrieve proximally migrated pancreatic stents.</td>
</tr>
<tr>
<td>00:10</td>
<td>With the white arrows both ends of this 5 cm long and 5 Fr caliber stent are marked.</td>
</tr>
<tr>
<td>00:21</td>
<td>Gentle cannulation of the pancreatic duct is performed…</td>
</tr>
<tr>
<td>00:33</td>
<td>… and a guidewire is passed into the pancreatic duct as it is confirmed by the fluoroscopic view.</td>
</tr>
<tr>
<td>00:48</td>
<td>Endoscopic pancreatic sphincterotomy is recommended to facilitate the extraction maneuvers of migrated pancreatic stents. Thus, introduction of different devices can be more securely performed without damaging the pancreatic duct.</td>
</tr>
<tr>
<td>01:08</td>
<td>Once the sphincterotomy is completed, a polypectomy snare is threaded over the guidewire and inserted gently into the pancreatic duct, avoiding trauma to the ampulla or pancreatic duct since insertion is performed over the guidewire.</td>
</tr>
<tr>
<td>01:25</td>
<td>The guidewire is pointed by the red arrow and the threaded snare is pointed by the white arrow.</td>
</tr>
<tr>
<td>01:40</td>
<td>Once the snare is inserted in the pancreatic duct, the distal end of the stent must be reached. As it can be seen in the video, access to the pancreatic duct is preserved with the guidewire.</td>
</tr>
<tr>
<td>02:06</td>
<td>At the level of the distal end of the stent, the snare is opened and manipulated in order to seize the stent and retrieve it.</td>
</tr>
<tr>
<td>02:30</td>
<td>Then, the snare is carefully pulled down extracting the stent and preserving the access to the duct with the guidewire.</td>
</tr>
<tr>
<td>02:43</td>
<td>The stent is completely extracted with limited damage to the papilla.</td>
</tr>
<tr>
<td>03:06</td>
<td>In this case since the patient had a healthy pancreas, after retrieving the migrated stent, another prophylactic pancreatic stent without internal flap was introduced in order to avoid post-procedure pancreatitis.</td>
</tr>
<tr>
<td>03:38</td>
<td>In the next case, indirect grasping techniques are demonstrated.</td>
</tr>
<tr>
<td>03:44</td>
<td>A pancreatic stent has migrated into the Santorini duct through the minor papilla. First, cannulation of the minor papilla is achieved using the guidewire technique.</td>
</tr>
<tr>
<td>03:56</td>
<td>After cannulation, minor papilla sphincteroplasty is performed to facilitate stent retrieval.</td>
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<tr>
<td>04:08</td>
<td>In fluoroscopy, it can be seen that the duodenal end of the stent becomes inserted into a secondary branch after migration.</td>
</tr>
<tr>
<td>04:16</td>
<td>… As pointed by the arrow.</td>
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<tr>
<td>04:20</td>
<td>This represents a challenging situation that we tried to solve with indirect grasping techniques.</td>
</tr>
<tr>
<td>04:29</td>
<td>First by introduction of a polypectomy snare into the Santorini duct, but it was not possible to seize the stent.</td>
</tr>
</tbody>
</table>
Second, we inserted a Dormia basket and failed again to grasp the stent.

We also made retrieval attempts with a pediatric tripod, but could not be grasped.

A foreign body forceps was then introduced in the Santorini duct with fluoroscopic control, and the stent could be extracted.

References