NICE National Institute for Health and Care Excellence

NICE guidance

Danis stent for acute oesophageal variceal bleeding

HealthTech guidance
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Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account, and specifically any special arrangements relating to the introduction of new interventional procedures. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the Yellow Card Scheme.

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties. Providers should ensure that governance structures are in place to review, authorise and monitor the introduction of new devices and procedures.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Contents

This guidance replaces MIB185 and MTG57.

1 Recommendations

1.1 Evidence supports the case for adopting Danis stent for treating acute oesophageal variceal bleeding. Danis stent improves the short-term control of bleeding compared with a balloon tamponade and can be left in place for longer, allowing time for stabilisation.

1.2 Danis stent should be considered for people aged 16 and over with acute oesophageal variceal bleeding that does not respond to endoluminal therapy and whose oesophageal varices are being considered for definitive treatment. Also, Danis stent should be considered for people when definitive treatment is not appropriate and if they are likely to be offered palliative care.

1.3 Cost modelling shows that Danis stent is cost saving compared with balloon tamponade for acute oesophageal variceal bleeding being considered for definitive treatment. This is because having Danis stent results in a shorter stay in intensive care. To be cost saving, Danis stent needs to decrease intensive care stay by approximately 1 day or more compared with balloon tamponade. For more details, see the NICE resource impact statement.

Why the committee made these recommendations

Danis stent puts pressure on enlarged veins (varices) in a person's food pipe (oesophagus) when they are bleeding uncontrollably. Enlarged veins can develop when a person has longstanding scarring liver disease (cirrhosis) that affects blood flow through the liver. This causes pressure in the blood vessel that drains blood from the gut into the liver and enlargement of these veins in the oesophagus can predispose to bleeding. Danis stent is designed to be used as a bridging treatment to control the bleeding until a decision on definitive treatment to manage the underlying pressure problem (such as a transjugular intrahepatic portosystemic shunt [TIPS] procedure, or band ligation) can be made. It can also be used for people when definitive treatment is not appropriate and if they are likely to be offered palliative care.

Studies show that Danis stent is better than the balloon tamponade device (a balloon inflation device that compresses the bleeding veins) in controlling bleeding in the short term. It can stay in place for up to 7 days. This is longer than the balloon tamponade, which needs to be removed after 24 hours. This allows more time to stabilise the person before their next treatment and also means that they do not usually need to stay in intensive care. Cost analysis concludes that Danis stent is cost saving compared with balloon tamponade because it reduces the number of days a person needs to stay in intensive care.

2 The technology

Technology

2.1 Danis stent is a self-expanding and removable stent used to stop acute bleeding from oesophageal varices. The stent is a variable weave, made of nitinol with a silicone membrane. It is 135 mm long and 25 mm in diameter at the centre, increasing to 30 mm in diameter at the flared distal ends. During insertion, a balloon is inflated in the stomach to make sure the stent self-expands in an accurate position at the gastro-oesophageal junction, providing direct compression of oesophageal varices. The aim of Danis stent is to stabilise the bleeding, until the person can have definitive treatment to manage the underlying problem. Features of the stent include radiopaque markers for visibility, a security pressure valve and retrieval loops with gold markers. The company recommends that Danis stent stays in place for no longer than 7 days. A specially designed removal device, the Ella extractor, is needed to remove the stent unless a definitive treatment has been done, in which case the risk of re-bleed may be considered low and the stent may be removed with grasping forceps.

Innovative aspects

2.2 The company states that Danis stent can be used without direct endoscopic imaging, which may allow for more rapid control of variceal bleeds in emergency situations compared with balloon tamponade. The delivery system has a security pressure valve that prevents the gastric balloon from being inflated in the oesophagus, which may help minimise the risk of oesophageal perforation. The stent can stay in place for up to a week (compared with balloon tamponade, which should not be left in place for more than 24 hours to 36 hours). This may allow more time to plan definitive therapy (such as transjugular intrahepatic portosystemic shunt [TIPS] insertion, usually done more than 72 hours after Danis stent insertion) or secondary band ligation. It may also keep the bleeding stable for longer, allowing liver function to improve. Danis stent keeps the oesophagus open, allowing oral nutrition to be maintained, which is an important

element in recovery. Its variable weave stent body is designed to conform to oesophageal peristalsis, with the aim of preventing stent migration.

Intended use

2.3 Danis stent is intended for use in acute refractory oesophageal variceal bleeding, after first-line therapy, such as variceal band ligation, has failed, to allow more time for a definitive procedure to be done. It is intended to be used as an alternative to balloon tamponade or early TIPS insertion (that is, done within 72 hours), in people aged 16 and over.

2.4 The technology is intended to be used in secondary or tertiary care by gastroenterologists, hepatologists, emergency care practitioners, paramedics or nurse practitioners. Comprehensive training is needed and is delivered by the company.

Costs

2.5 The cost of Danis stent is £1,495 (excluding VAT) per stent. The cost of the Ella extractor is £695 (excluding VAT).

For more details, see the website for Danis stent.

3 Evidence

NICE commissioned an external assessment centre (EAC) to review the evidence submitted by the company. This section summarises that review. See the committee papers for full details of the evidence.

Clinical evidence

The main clinical evidence comprises 9 studies

3.1 The evidence assessed by the EAC included 9 full-text peer-reviewed studies including 247 people. Two of the studies were comparative: a randomised controlled trial and a retrospective case-controlled study. The remaining 7 studies were non-comparative case series. For full details of the clinical evidence, see section 3 of the assessment report in supporting documentation.

The comparative evidence is relevant to the decision problem but has limitations

3.2 Both comparative studies compare the use of Danis stent with balloon tamponade. The studies report that using Danis stent improves control of bleeding at 5 days and 15 days. The randomised controlled trial (Escorsell et al. 2016) is the strongest evidence for Danis stent and reports a composite end point including control of bleeding and adverse events but it is underpowered for this result. The retrospective case-controlled study only included patients with acute-on-chronic liver failure and there were significant differences between the disease-severity scores of the patients in the control group compared with the interventional group. The EAC reported that both studies have a moderate risk of bias.

The randomised controlled trial (Escorsell et al. 2016) is not reflective of the UK care pathway

3.3 The randomised controlled trial was done in Spain and differences in the care pathway limit the generalisability of the findings to the UK setting. Expert advisers stated that the definitive procedure, transjugular intrahepatic portosystemic shunt (TIPS), was delivered at an earlier stage after presentation in this trial than it would be in the UK.

The EAC did a meta-analysis on the 7 non-comparative studies

3.4 The 7 non-comparative studies are low in quality. The studies have broadly similar populations and outcomes. Outcomes with low heterogeneity were included in the analysis. Immediate bleeding control was found to have been achieved in 88% of cases (95% confidence interval 0.38 to 0.9) based on the 7 case series, one of which (Wright et al. 2010) was done in the UK. Survival rate at 30 days was 68% from 3 studies.

Cost evidence

The company's comparison of the cost of Danis stent and balloon tamponade uses a cost-calculator model

3.5 The cost comparison has a 6-week time horizon and is from an NHS and personal and social services perspective. The model estimates the cost associated with using Danis stent compared with balloon tamponade as bridging treatment for patients aged 16 or over with acute refractory oesophageal variceal bleeding in whom first-line therapy is unsuitable or has failed. The model captures the cost of the initial procedures, the likelihood of adverse events for both technologies and the cost and use of resources to remove the devices. The key model parameters are:

- The proportion of patients that have either balloon tamponade or Danis stent as a bridging treatment and the proportion of patients that have either TIPS

or band ligation as a definitive treatment.

- Survival 6 weeks after treatment and relative risk of dying at 6 weeks with balloon tamponade compared with Danis stent.
- Proportion of patients that have adverse events after treatment.

For full details of the cost evidence, see section 4 of the assessment report in supporting documentation.

The EAC's updates to the cost model change the direction of the cost case

3.6 The EAC updated 5 cost parameters, including the cost of:

- removing Danis stent (company, £1,257.00; EAC, £1,452.00)
- re-bleed (company, £3,287.00; EAC, £4,978.75)
- definitive TIPS treatment (company, £3,928.00; EAC, £4,965.56)
- definitive band ligation (company, £1,114.00; EAC, £4,983.67)
- severe hepatic encephalopathy (company, £400.52; EAC £400.56).

3.7 With the updated cost parameters, the EAC's base case shows that Danis stent is cost incurring by £923.00 per person. The company also presented 3 scenario analyses, all of which the EAC considered relevant. Scenario 1 modelled the cost of using each technology by cumulating the costs of the resources needed. Scenarios 2 and 3 explored uncertainty in the assumed impact of the bridge treatment on the choice of definitive treatment including (scenario 3) and excluding (scenario 2) hepatic encephalopathy costs.

Two additional scenario analyses include a second endoscopy for patients who have a balloon tamponade

3.8 Clinical experts highlighted that a second endoscopy at the time of balloon removal is needed for people that have balloon tamponade. The choice of definitive treatment is done on a case-by-case basis regardless of the bridging treatment used. Therefore scenarios 4 and 5 were done to include the cost of a second endoscopy:

- Scenario 4 – an extension of scenario 2 but with the addition of a second endoscopy for people treated with balloon tamponade based on expert comments.
- Scenario 5 – an extension of scenario 1 to explore the impact of reduced intensive care unit (ICU) bed days in the Danis stent group and a second endoscopy for people treated with balloon tamponade.

Updates to resource parameters in the micro-costed model are based on expert advice and data about hospital admissions

3.9 Estimates about resource use in the care pathway were updated based on expert advice and were reported as scenarios 5A and 5B. The key parameters changed were the:

- proportion of patients that had Danis stent inserted in a theatre setting (increased)
- ICU length of stay in the Danis stent group (reduced) and in the balloon tamponade group (increased)
- cost of the balloon tamponade procedure (increased).

3.10 Costs were modelled for the proportion of patients that needed transferring from a secondary care setting to a tertiary care setting (scenario 5B only).

4 Committee discussion

The clinical care pathway is complex

4.1 The clinical experts explained that oesophageal variceal bleeding is an acute clinical emergency and clinical care is managed on a case-by-case basis. First-line treatment is an endoscopy followed by band ligation. However, in rare cases, balloon tamponade may be done to control the bleeding before an endoscopy. If first-line therapy fails, balloon tamponade or Danis stent is used as a bridging therapy to stabilise the patient before a definitive treatment can be done, such as transjugular intrahepatic portosystemic shunt (TIPS) insertion.

4.2 People who cannot have definitive treatment are given palliative care. Clinical experts explained that Danis stent can be used to control bleeding as a component of palliative care after all other lines of treatment have failed or if the patient cannot have definitive treatment with TIPS or transplant surgery. The committee concluded that the care pathway is complex, and that practice varies depending on the individual circumstances of each patient.

Balloon tamponade is an appropriate comparator

4.3 The committee noted that TIPS was included as a comparator in the scope and that in the randomised controlled trial TIPS was done within 72 hours of presentation. The experts explained that when TIPS is done this early it could be considered a comparator to Danis stent. However, the experts explained that it usually takes between 5 days and 7 days to deliver TIPS in the UK and that Danis stent would be used before this timepoint. The committee concluded therefore that, in the UK NHS setting, balloon tamponade is the best comparator for Danis stent.

The evidence shows that Danis stent improves short-term clinical outcomes

4.4 The comparative evidence reported that Danis stent improves control of bleeding for patients in the short term (15 days). The committee recognised there were some key limitations in the evidence. For example, the population included in the retrospective case-controlled comparator study (Maiwall et al. 2018) was limited to patients with acute-on-chronic liver failure, and the randomised controlled trial (Escorsell et al. 2016) was underpowered and was not done in the UK. The committee considered the randomised controlled trial to be the most robust evidence for Danis stent and recognised the difficulties in doing controlled studies and generating evidence in this patient population. While the committee acknowledged the limitations in the studies it concluded that on balance the evidence shows that Danis stent improves short-term clinical outcomes.

The evidence does not reflect the potential use of Danis stent in the UK care pathway

4.5 The randomised controlled trial (Escorsell et al. 2016) was done in Spain and the clinical experts advised that TIPS was more accessible in this trial than it would be in the UK. They explained that TIPS procedures are arranged and done in regional tertiary centres in the UK and that this procedure may only be suitable for people with less severe liver disease (Child–Pugh score A). In contrast, the experts explained that in the randomised controlled trial patients with more severe liver disease (Child–Pugh score B or C) were given a TIPS procedure, and were given it at an earlier timepoint than in the UK. The committee concluded that the protocol used in the randomised controlled trial does not accurately reflect UK practice.

Side effects and adverse events

Adverse events are unlikely if users are well trained in using Danis stent

4.6 Stent migration is reported to happen in 20% of cases. Clinical experts explained that, in their experience, this figure is likely to be an overestimation and that stent migration happens rarely if operators are fully trained in using the device. They advised that there is a small risk of lung aspiration with the procedure and that the patient's condition should initially be managed in an intensive care setting after stent insertion. The risk of oesophageal perforation is higher in patients who have had balloon tamponade first. The committee concluded from the evidence and expert advice that using Danis stent does not increase the risk of an adverse event.

Outcome measures

The evidence is limited to a 6-week follow-up time but this is acceptable

4.7 The evidence is limited to a follow-up time of 6 weeks or less. The committee recognised that some patients who have definitive treatment will live beyond 6 weeks, however it noted that the clinical evidence did not report a significant difference in mortality at 6 weeks between the Danis stent group and the balloon tamponade group. The committee also understood that people with oesophageal variceal bleeding have other comorbidities that are likely to affect survival beyond 6 weeks. So it concluded that the time horizon to definitive treatment was appropriate for the cost modelling.

NHS considerations

The evidence does not capture all the system benefits of using Danis stent

4.8 Danis stent can be left in place for up to 7 days compared with a balloon tamponade, which needs to be removed after 24 hours. The clinical experts commented that, in secondary or tertiary care settings, this additional time allows healthcare professionals the time to stabilise and monitor patients and arrive at a carefully considered clinical decision about the next stage of treatment. They highlighted that, when patients need to be transferred to a tertiary care centre for definitive treatment, using Danis stent can increase patient safety during the transfer. The committee recognised that there are limitations in the evidence and accepted expert advice about the additional patient and system benefits.

Training

Danis stent users need training and regular reskilling

4.9 Healthcare professionals are trained to use Danis stent. Clinical experts stated that training is straightforward for healthcare professionals with experience of endoscopic procedures and it is also possible to gain the necessary skills even without this experience. They described how maintaining clinical competence in a large team is challenging because of the limited number of patients needing this procedure each year, which necessitates regular reskilling. The committee considered that a lack of clinical confidence in using Danis stent during a medical emergency situation might serve as a barrier for adoption and suggested that the company should make sure centres that use the device have access to training and reskilling support.

Other patient benefits or issues

Danis stent has benefits for people for whom further treatment

may not be suitable

4.10 The clinical experts advised that, for a small proportion of the patient cohort, estimated at between 5% and 6%, further definitive treatment may not be appropriate. The clinical experts advised that Danis stent can be used if all previous lines of therapy have failed, and in patients for whom either transplant surgery or a TIPS procedure is not suitable. After the stent is inserted, patients can be extubated, moved off a high dependency ward and managed in a more comfortable and less intensive environment where interaction with family and friends is more possible. The clinical experts explained that when used in this way Danis stent can stay in place for at least 7 days and even longer. This scenario was not included in the cost modelling, however the committee recognised that data collection is unrealistic in this population. It concluded that, in the proportion of people for whom definitive therapy is not appropriate, using Danis stent may offer substantial patient benefits in alleviating suffering and allowing compassionate care.

Cost-modelling overview

The base-case assumptions are not reflective of UK practice

4.11 The EAC base-case cost model used clinical parameters based on the randomised controlled trial (Escorsell et al. 2016) and case series data. The committee received the following expert advice:

- definitive treatment is decided on a case-by-case basis in the NHS and is not affected by the choice of bridging treatment
- a second endoscopy is needed in the balloon tamponade group, which was not included in the base-case model
- use of multiple healthcare resource group costs could result in an overestimation of procedure costs
- the incidence of hepatic encephalopathy should not differ between arms.

The committee concluded that the assumptions used in the base case did

not accurately reflect the cost of using Danis stent in the UK.

Scenarios based on expert advice to estimate resource use in the care pathway are acceptable

4.12 The EAC developed scenarios 5A and 5B based on clinical advice so that the cost model better reflected UK practice. Scenario 5A reported that using Danis stent was cost saving by £2,423. Scenario 5B included the cost of transferring a proportion of people from secondary to tertiary care, although this cost had little effect on the results. This scenario reported Danis stent to be cost saving by £2,426. The main cost drivers of these scenarios were the risk of re-bleeding, the procedure costs and the estimated length of intensive care unit (ICU) stay. The committee recognised that there were uncertainties in the parameters because they were primarily based on expert advice, but concluded that scenarios 5A and 5B were the most appropriate models for estimating the cost of Danis stent in the NHS.

Danis stent is cost saving and length of ICU stay is the main cost driver

4.13 The committee noted that the estimated difference in length of ICU stay had the greatest effect on the direction of the cost case results. Clinical experts estimated that length of ICU stay for the Danis stent group is 3.6 days, and 6 days for the balloon tamponade group. The EAC did a threshold analysis for this parameter and reported that Danis stent would be cost neutral or cost saving when the balloon tamponade group had an increased length of ICU stay of 0.6 days or more compared with the Danis stent group. The committee accepted the expert clinical advice that the clinical effectiveness of Danis stent is likely to affect the length of ICU stay and concluded that in all probability, Danis stent will reduce time in ICU by more than approximately 1 day (that is, more that 0.6 days) in UK clinical practice. The committee concluded that Danis stent is very likely to be cost saving compared with balloon tamponade in people being considered for definitive treatment for oesophageal varices.

Further data collection is welcome to address uncertainties in the cost case

4.14 The committee recognised that there are uncertainties in the cost case because of the limited information available about resource use. The committee noted that a planned multicentre UK randomised controlled trial was not completed because of difficulties with recruitment. It recognised that generating evidence is challenging in this small and heterogenous population and accepted that expert advice was an appropriate alternative to definitive UK evidence. Further data collection is welcomed by the committee to inform more accurate assessments of the cost savings associated with using Danis stent in the future.

5 Committee members and NICE project team

Committee members

This topic was considered by NICE's medical technologies advisory committee, which is a standing advisory committee of NICE.

Committee members are asked to declare any interests in the technology to be appraised. If it is considered there is a conflict of interest, the member is excluded from participating further in that evaluation.

The minutes of the medical technologies advisory committee, which include the names of the members who attended and their declarations of interests, are posted on the NICE website.

NICE project team

Each medical technologies guidance topic is assigned to a team consisting of 1 or more health technology assessment analysts (who act as technical leads for the topic), a health technology assessment adviser and a project manager.

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Update information

Minor changes since publication

December 2025: Medical technologies guidance 57 has been migrated to HealthTech guidance 574. The recommendations and accompanying content remain unchanged.

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