

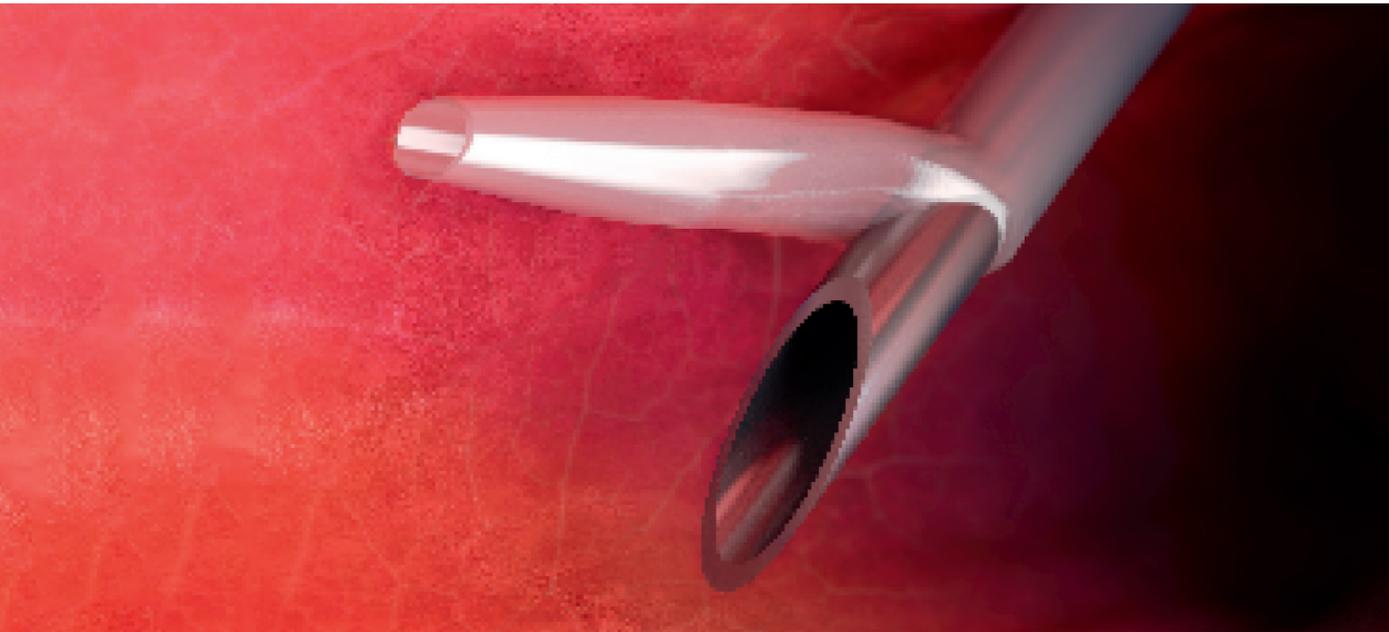


Catheter Fragmentation

Risk prevention by avoiding
reinsertion of IV catheters

Catheter Fragmentation

IV catheter placement – a daily challenge



Cut catheter tip

Peripheral IV catheters are a crucial element of today's infusion therapy and regular tool in clinical practice. Even though a routine process, not every cannulation is successful on its first attempt and may lead to catheter reinsertion. A study has shown that reinsertion happens in up to 5% of catheterizations, resulting in a 23-fold risk of cannulation failure.¹

Any attempt to reinsert the metal needle after advancement of the catheter carries the risk of catheter shearing due to the sharp cutting edge of the needle bevel.^{2,3,4}

Such a loss or displacement of foreign material, such as ruptured or sheared-off catheters, within the cardiovascular system is not an uncommon event.

Shearing of catheter sheath by reinsertion of the steel needle due to unsuccessful cannulation is only rarely documented in the medical scientific literature.⁴ However, the impact of underreporting may be estimated to be high as it is known to be for needlestick injuries.⁵

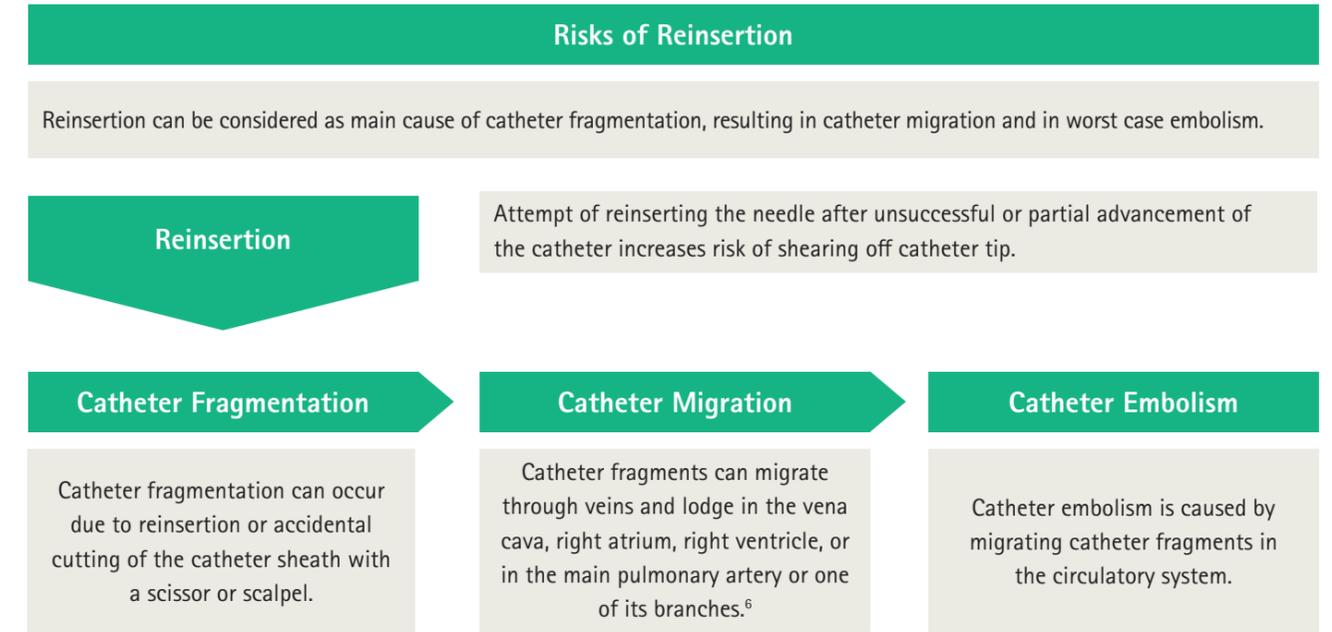
Reinsertion happens in up to

4.5 %

of catheterizations.¹

Causes and Risks

When does it happen?

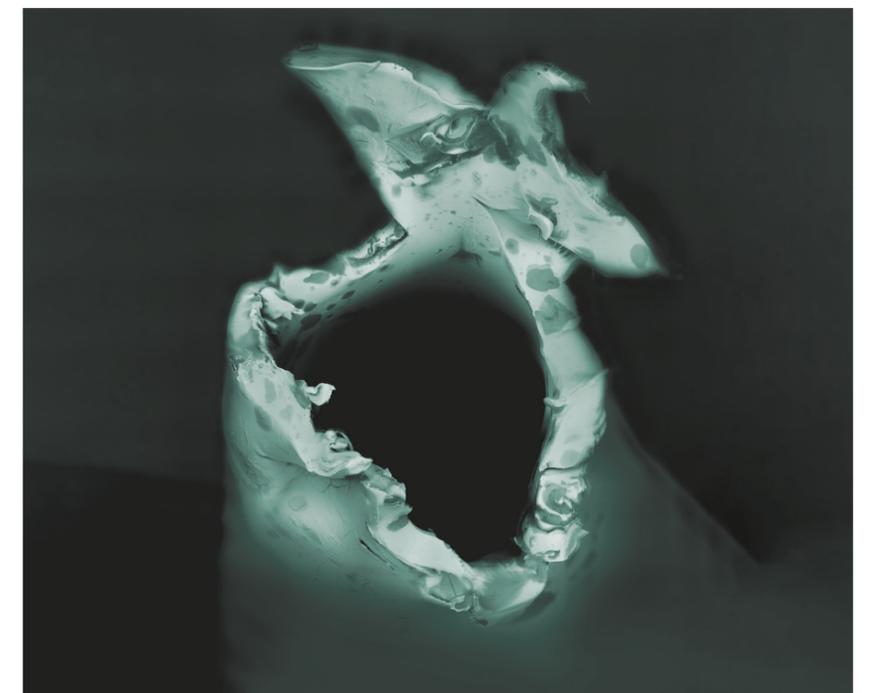


Example case

Lee et al.³ published a case report of a patient with a sheared catheter fragment in the wrist after an arterial cannulation attempt.

The first cannulation attempt was not successful and instead of removing the cannula and discarding the catheter completely, the needle was placed back into the catheter and re-advanced. When removing the catheter abruptly, only 1.8 cm of the catheter was attached to the hub while 1.2 cm were missing.

Investigations (ultrasound, x-ray, CT-scan) revealed the 1.2 cm fragment within the subcutaneous tissue adjacent to radial arterial. Surgical removal was done successfully.



Microscopic view of sheared-off catheter tip (exemplary)

Consequences

Impact of catheter embolism on patient health

Catheter emboli are a significant risk to patient well-being. With a 49% complication rate for indwelling catheter emboli, the consensus is that these foreign bodies should be removed.^{2,3}



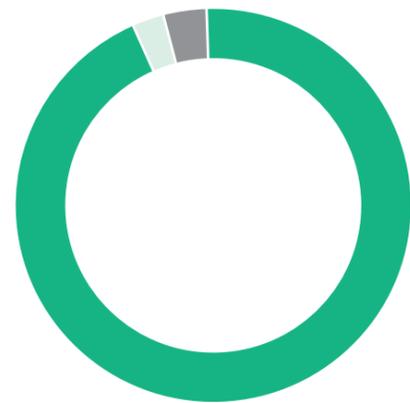
Before removal of the catheter emboli, it has to be detected. To distinguish the catheter sheath from the surrounding tissue, X-ray, CT scan or ultrasound can be used.^{2,6} The radiopaque stripes in the catheter help to identify the catheter fragment through X-ray.⁷

The majority of catheter fragments are removed by percutaneous extraction. However, if the emboli are in the heart or central vasculature and percutaneous extraction fails, then surgical removal (thoracotomy) is necessary.⁶

The extraction of embolized fragments is not always possible. Depending on the symptoms and surgical risks, smaller peripheral and often encapsulated foreign bodies may be left in situ – although control examinations must then be performed. However, not removing the fragments can result in mortality.⁶

Apart from the risk for the patient, additional cost through additional examination (e.g. X-ray, CT, ultrasound) and percutaneous or surgical removal must be encountered.

Ways of catheter fragment removal⁶



- 2.3 % Embolized fragments removed surgically via thoracotomy
- 4.2 % Fragments retained in the vascular bed
- 93.5 % Fragments removed percutaneously

Conclusion

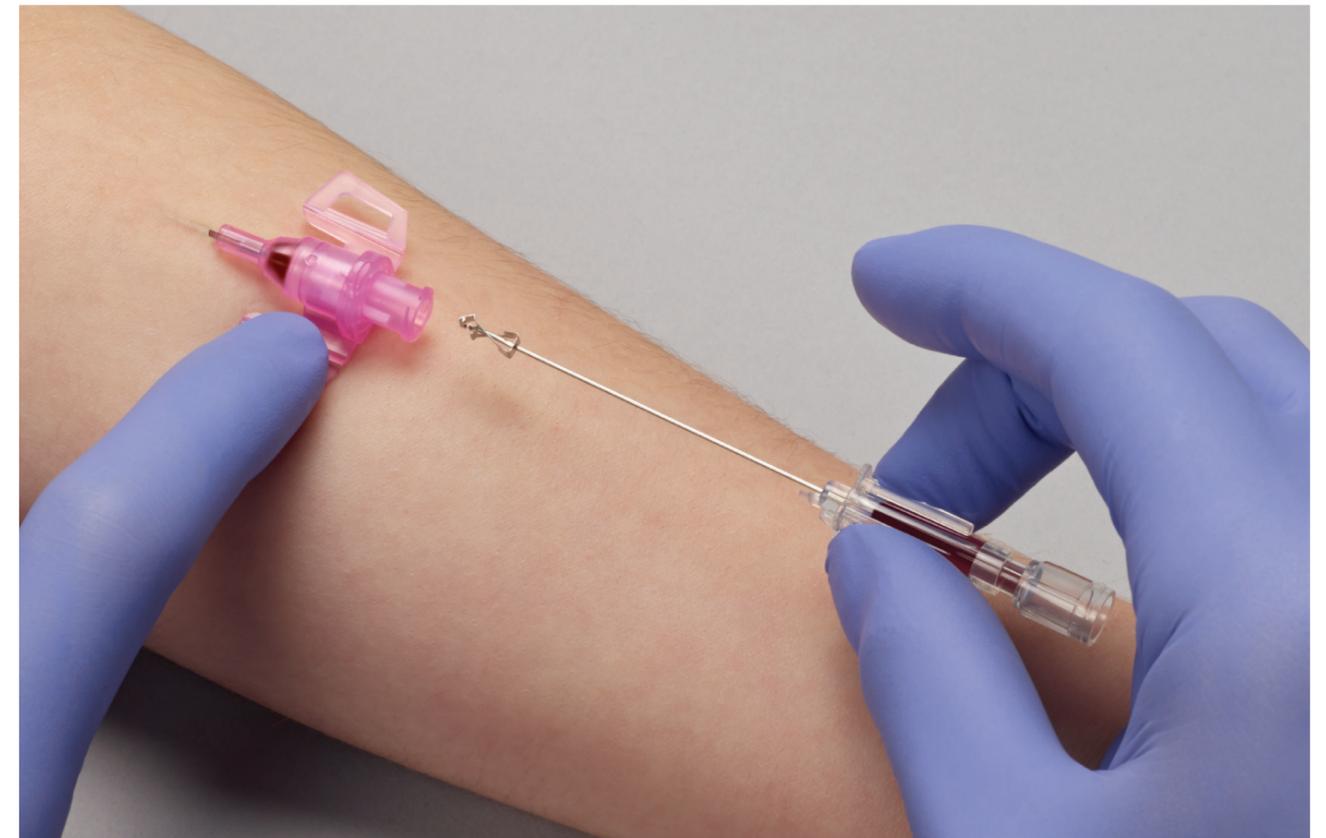
Catheter reinsertion increases the risk of catheter shearing, resulting into catheter fragmentation, migration and subsequent catheter embolism. This can lead to additional risks not only for the patient's health but also may require additional medical intervention (and cost) to remove the catheter fragment.

Preventive Strategies

Strategies to help avoid catheter fragmentation



- Do not reinsert the needle into the catheter after failed first attempt³
- Avoid advancing both catheter and needle with needle already partially withdrawn⁴
- Once needle is partly removed from catheter withdraw needle completely
- Use of IV catheters with passive safety mechanism may help to prevent reinsertion of the needle into the catheter
- Follow instructions for use of IV catheter products
- Ensure correct position of the patient according to the procedure
- Avoid abrupt removal
- Removed catheters should be checked for possible damages⁶
- Ensure awareness and trained nursing staff on potential risk⁸



B. Braun Safety IV Catheters

Passive safety mechanism to help avoid reinsertion

The B. Braun Safety IV Catheters have a passive safety mechanism that is automatically activated once the needle is withdrawn out of the catheter hub, making reinsertion of the needle not possible.



Passive Safety Shield

- is a passive, fully automatic protection of the needle tip
- It deploys automatically and requires no user activation
- Cannot be bypassed
- Designed to eliminate needlestick injuries and related infections^{9,10}
- Passive Safety is most effective at preventing needlestick injuries^{9,10}
- Passive Safety is proven to be better than a semi-automatic 'push-button' safety shield or manually sliding shield¹⁰

Product Overview

Introcan Safety® 3 – Closed IV Catheter



- Multi-access blood control septum
- Passive safety shield
- Stabilization platform
- Portfolio: G14-G24 / 19-50mm length
- Available in PUR



Introcan Safety® – Safety IV Catheter



- Passive safety shield
- With/ without small wings
- Portfolio: G14-G24 / 14-64mm length
- Available in PUR & FEP



Introcan Safety® Deep Access – Safety IV Catheter for deep vein access



- Passive safety shield
- Without small wings
- Longer indwell times¹¹
- Portfolio: G18-G22 / 64mm length, G24 / 32mm
- Available in PUR



Vasofix® Safety – Safety IV Catheter with injection port



- Injection port
- Passive safety shield
- Fixation wings
- Portfolio: G14-G24 / 19-50mm
- Available in PUR & FEP



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