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Peripheral Intravenous (IV) cannulation should be avoided in the stroke affected upper limb

A. Hussain[1], B. Grewal[2], R. Singh[1].

1. Department of Stroke Medicine, Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom.
2. Department of Palliative Medicine, Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom.

Abstract

Peripheral Intravenous (IV) cannulation is a common clinical procedure conducted in most stroke patients during their hospital admission. IV access is crucial in the hyperacute and rehabilitation phases of stroke care for administering lifesaving treatments, conducting investigations, managing secondary risk factors and treating stroke related complications. Despite its importance, peripheral IV cannulation can cause several complications including infection, thrombosis, and pain. In stroke patients with motor and sensory impairments, cannulation poses unique challenges and can potentially hinder rehabilitation interventions and increase risks of injury and post stroke spasticity. This paper explores the lack of specific guidelines for IV cannulation in the stroke affected upper limb and emphasizes the necessity of careful consideration and alternative strategies to mitigate risks.

Peripheral Intravenous (IV) cannulation is one of the most commonly performed clinical procedures in stroke patients. Up to 70% of inpatients require at least one cannula during their stay in hospital[1].

IV access is a critical component in the hyperacute phase of stroke care. It facilitates the administration of life-saving treatments such as IV thrombolysis, aids in blood pressure control using IV antihypertensive medications, and enables the use of contrast agents for the localization of large vessel occlusion and dissection[2,3,4]. It also plays a crucial role in reversing anticoagulation in cases of vitamin K antagonists, IV hydration, and IV antibiotics for aspiration pneumonia[5,6,7]. There is a subset of Stroke patients who require prolonged hospital stay for rehabilitation and consequently may require peripheral IV cannulation for Stroke related complications over a period of weeks.

Peripheral IV cannulas are associated with a number of complications including infection, thrombosis, pain, migration or inadvertent removal[8]. Given these risks, cannulation is avoided in several situations when it presents the possibility of harm to the patient.

In dialysis patients' IV access is avoided in the fistula arm because fluids or drugs can compromise fistula patency and lead to infection and thrombosis[9]. Similarly, cannulation should be avoided in patients with mastectomy and radical axillary dissection because of the higher risk of complications like lymphedema and infection, owing to the lack of reduced numbers of draining lymph nodes[10]. The compromised lymphatic system and the potential for increased pressure in the affected areas can lead to adverse outcomes.

In a large proportion of stroke patients' motor hemiparesis and sensory impairments are present and can result in a flaccid upper limb with sensory loss. There is a paucity of data on peripheral IV cannulation in stroke patients with sensorimotor deficits. There are no established guidelines to date to help clinicians weigh up the risks of cannulating a hemiparetic upper limb versus the benefits that IV therapy may offer. We performed a literature search and found no dedicated papers on this topic. One opinion piece highlighted that cannulation should be avoided in the hemiparetic upper limb unless in an emergency clinical situation[11]. A second case report similarly mentions that cannulation should be avoided in these patients to reduce risk of venous thromboembolic (VTE) episodes[12].

Healthcare staff may consider routine peripheral IV cannulation of the hemiparetic side to be more comfortable for the patient with a lower chance of dislodgement because of paralysis, sensory impairment, and inattention. However, there are several important issues that render cannulation of the stroke affected upper limb inappropriate.

Firstly, the presence of a peripheral IV cannula can negatively impact the frequency and intensity of effective upper limb therapeutic interventions. According to the latest National Stroke Guidelines people with motor goals should receive a minimum of 3 hours of multidisciplinary therapy a day, at least 5 days out of 7[13]. There is evidence that post stroke the brain is primed for recovery and early rehabilitation leads to better functional outcomes[14]. The presence of a peripheral IV cannula limits passive range of motion exercises that are important in preventing soft tissue shortening and contracture formation. Furthermore, a proportion of patients will have early motor and sensory recovery which is important to capitalise upon. The presence of a cannula may hinder the ability of the patient and therapy staff to incorporate repetitive task practise, vagus nerve stimulation, constraint-induced or robot-assisted movement therapy because of its potential to restrict movement and encourage learned non-use[13,15].

Secondly, due to the presence of sensory impairment in the hemiparetic side, cannulation-related tissue injuries (such as phlebitis, extravasation and cellulitis) may not be detected. These often rely not only on objective visual measures by healthcare staff but also through patients self-reporting discomfort.

Thirdly, pain is a recognised driver for post stroke spasticity[16]. An IV cannula is itself enough to act as a noxious stimulus and therefore increase the risk of upper limb spasticity. The aforementioned complications (phlebitis, extravasation, cellulitis) similarly can contribute to spasticity and their impact can be prolonged even if the offending cannula is removed.

Finally, peripheral IV cannulation has the potential to cause thromboembolism in the hemiparetic upper limb[17]. VTE is a recognised complication post stroke with the incidence reported as between 10-75%.[18] Damage to the intravascular vessel wall by the cannula along with venous stasis caused by the hemiparetic upper limb as well as hypercoagulable states seen often in stroke patients will increase the risk by theory of Virchow's triad[19].

In an acute situation, if there is no other access available and time-dependent life-saving intervention is required, then IV access can be secured on the hemiparetic side, such as for thrombolysis and can be changed to the non-affected side as early as possible. In such cases if there is no easily identifiable vein ultrasound guided cannulation would be prudent.

Peripheral IV cannulation, while essential in stroke care, poses significant risks and challenges, especially for patients with sensorimotor deficits. The lack of established guidelines for cannulation in hemiparetic limbs requires a careful assessment of the risks versus benefits. While routine cannulation on the hemiparetic side may seem convenient, it can hinder rehabilitation, increase the risk of injuries, and worsen spasticity.

In urgent situations where no other IV access is available, it is essential to use careful strategies, such as ultrasound-guided cannulation. Further research and development of specific guidelines are crucial to optimize care for stroke patients, balancing the immediate benefits of IV therapy with long-term functional recovery and safety.

Declarations of Conflicts of Interest:

None declared.

Corresponding author:

Rajinder Singh,
Department of Stroke Medicine,
Leeds Teaching Hospitals NHS Trust,
Leeds,
United Kingdom.
E-Mail: Rajinder.singh10@nhs.net.

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