



Rumpel-Leede (RL) phenomenon

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Abstract

Rumpel-Leede phenomenon, also known as the Hess test or Tourniquet test or capillary fragility test refers to acute dermis capillary rupture, is classically seen in microvascular fragility disorders and relates either to a vasculopathy or to a reduced number or function of the platelets.

The phenomenon is considered nonspecific, it occurs in response to application of a compressive device such as when inflating a blood pressure monitoring cuff or when applying a tourniquet which results in capillary rupture and formation of a petechial rash distal to the compression device. R-L phenomenon is believed to occur most often in patients with underlying vascular disease, such as diabetes mellitus or thrombocytopenia. Historically it has been used for the assessment of capillary fragility and thrombocytopenia though petechiae are caused by physical traumas or medical conditions. Phenomenon is mostly benign and usually resolves within 2 weeks with no treatment except the treatment of the underlying vascular disease or thrombocytopenia, if any. Thus awareness of this phenomenon can avoid the need of unnecessary investigations.

Introduction

Rumpel-Leede phenomenon, refers to acute dermis capillary rupture syndrome, is classically seen in microvascular fragility disorders. The phenomenon is described in various conditions like scurvy, bleeding disorders such as dengue fever or thrombocytopenia and drug-induced erythema multiforme.¹

History

The Rumpel–Leede sign is a distal shower of cutaneous petechiae that occurs after tourniquet

application. It was first reported in 1909 by Rumpel (Theodor Rumpel; a German Surgeon) and in 1911 by Leede as a clinical sign of scarlet fever it soon became associated with many other conditions like leukaemia, liver disease and infantile scurvy. Currently the phenomenon is considered as nonspecific, related either to a vasculopathy or to a reduced number or function of the platelets.²

Conditions Showing Rumpel-Leede phenomenon

1. Hypertension³
2. Idiopathic thrombocytopenic purpura,⁴
3. Thrombotic thrombocytopenic purpura,⁴
4. DM,⁴
5. Fat embolism,⁴
6. Intravenous drug users,⁴
7. Infectious diseases such as Rocky Mountain spotted fever, meningococemia,⁴
8. Disseminated intravascular coagulopathy,⁴
9. Elderly patients,⁴
10. Mechanical trauma,⁵
11. Ehlers-Danlos syndrome,⁶
12. Calcium channel blocker usage,⁷
13. Chronic steroid use,⁷
14. Platelet dysfunction,⁷
15. Drug-induced erythema multiforme.¹

Method of elicitation

The Rumpel-Leede test also called Hess test or Torniquet test or Rumpel-Leede test capillary fragility test is used to test capillary fragility. The phenomenon is a rare event characterised by the appearance of petechiae in an area following application of pressure on vessels, such as by a tourniquet, for 10 min or less.⁴ It is said to be present when there is an acute onset of more than 20 petechiae/square inch after inflating the blood pressure cuff to a point midway between systolic and diastolic blood pressure.¹ The resulting ecchymosis and petechiae can be alarming but have been shown to spontaneously resolve in 6 to 14 days without any known long-term consequence. Although most of the times it is asymptomatic only a few patients complain of pain.⁴ Originally the phenomenon was described after prolonged venous occlusion by a tourniquet and has also been reported in patients with impaired collagen integrity leading to capillary fragility.⁸

Pathophysiology of Rumpel-Leede phenomenon

Rumpel-Leede phenomenon associated with noninvasive blood pressure monitoring (NIBP) (Fig.1)

Although non-invasive blood pressure (NIBP) monitoring is regarded as a safe procedure, however it can sometimes cause petechial rash, ecchymoses, venous stasis, thrombophlebitis, infection, hematoma formation in patients on anticoagulants, compartment syndrome, compressive neuropathy and skin necrosis.² The most likely cause is increased venous pressure during cycling of the BP cuff in a hypertensive state during NIBP.⁴



Fig. 1: A case of Rumpel Leede sign after blood pressure monitoring.

Meningococemia

Thrombocytopenia and possibly mild vasculitis may possibly explain the phenomenon in patients of meningococemia.²

Rumpel–Leede Phenomenon after Radial Artery Catheterization

Rumpel–Leede phenomenon developing in patients after hemostasis with a radial artery pressure band after coronary angiography is due to localized high venous pressures causing capillary rupture into the dermis, resulting in a petechial rash.⁸

Rumpel-Leede Phenomenon in a Patient with Laboratory Markers Positive for Sjögren Disease

Rumpel-Leede phenomenon in a healthy patient without history of diabetes mellitus, hypertension, or thrombocytopenia, but with laboratory markers for Sjögren disease suggested a multifactorial etiology including vascular fragility because of extraglandular dermal manifestations of Sjögren disease and local elevated venous pressure because of blood pressure cuff inflation.⁷

Rumpel-Leede Phenomenon Associated With Tourniquet-like Forces of Baby Carriers: Baby Carrier Purpura

Acute-onset petechiae and purpura can be alarming, accounting for approximately 2.6% of all paediatric emergency department visits. In a 2012 retrospective review of 36 well-appearing infants presenting to emergency departments with petechiae and purpura in the absence of fever postulated an association with “mechanical forces,” but no specific cause was confirmed.⁵

Suggestions to avoid this problem

Devbhandari et al. suggested following precautions while using tourniquet:

- 1) Avoid wrapping the cuff tightly,
- 2) Avoid applying the cuff across a joint, bony prominence or superficial nerve,
- 3) Periodically inspect and alternated the cuff site,
- 4) Carefully control BP,
- 5) Select the maximum cycle time with satisfactory monitoring,
- 6) Keep device alarms enabled.
- 7) Consider the possibility of a device malfunction and
- 8) Consider use of a thin layer of padding between the BP cuff and the skin. A thin cotton layer significantly reduced cuff-related trauma and there was no significant effect on systolic, mean and diastolic arterial BP.⁴

Conclusion

In conclusion, a lack of awareness of this phenomenon can lead to unnecessary investigations. Anesthesiologists must be aware that acute dermal capillary rupture, although rare, can occur in patients with long standing DM, hypertension and chronic steroid use etc. and must discuss the benefits and drawbacks with the surgeon if tourniquet is contemplated by the surgeon. A high risk of hematoma and compartment syndromes, as well untreatable diffuse bleeding and hemorrhagic shock in Ehlers-Danlos syndrome subtypes with vascular fragility. Rumpel-Leede phenomenon presenting as “baby carrier purpura” may help spare infants from unnecessary, costly, and invasive evaluations and treatments.

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