



RUMPEL-LEEDE PHENOMENON FOLLOWING RADIAL ARTERY CATHETERISATION

Floyd A. Pirtle¹, Dylan Maldonado², Pitchaporn Yingchoncharoen³, Jerapas Thongpiya³, Natnicha Leelaviwat³, Annia Cavazos³, Cloyce L. Stetson²

¹ School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX, USA

² Department of Dermatology, Texas Tech University Health Sciences Center, Lubbock, TX, USA

³ Department of Internal Medicine, Texas Tech University Health Sciences Center, Lubbock, TX, USA

Corresponding author: Pitchaporn Yingchoncharoen **e-mail:** pitchaporn.yin@gmail.com

Received: 23/06/2023 Accepted: 26/06/2023 Published: 14/07/2023

Conflicts of Interests: The Authors declare that there are no competing interests.

Patient Consent: Verbal and written consent was obtained from the patient to publish her case.

This article is licensed under a Commons Attribution Non-Commercial 4.0 License

How to cite this article: Pirtle FA, Maldonado D, Yingchoncharoen P, Thongpiya J, Leelaviwat N, Cavazos A, Stetson CL. Rumpel-Leede phenomenon following radial artery catheterisation. *EJCRIM* 2023;10:doi:10.12890/2023_003990.

ABSTRACT

Rumpel-Leede phenomenon is a rarely diagnosed entity that can be seen in patients following the application of tourniquet-like forces to the extremities. This phenomenon describes petechiae and purpura secondary to venous compression and congestion, with its underlying aetiology involving the fragility of capillary vessels within the dermis. This condition is associated with chronic medical conditions such as diabetes mellitus, hypertension, dyslipidemia, peripheral vascular disease and systemic inflammatory diseases, including infections. In addition, patients with coagulopathy including thrombocytopenia or platelet dysfunction from antiplatelet use, or those with thrombotic thrombocytopenic purpura and idiopathic thrombocytopenic purpura, are predisposed to capillary haemorrhage and petechiae formation. In this report, we present a case of a patient who developed Rumpel-Leede phenomenon following catheterisation of the right radial artery with spontaneous resolution – where only five cases have been reported to date – with the aim to make clinicians aware of this condition and to avoid unnecessary interventions.

KEYWORDS

Rumpel-Leede phenomenon, tourniquet, capillary

LEARNING POINTS

- Rumpel-Leede phenomenon is a benign condition that can be seen after tourniquet-like compression of a limb in those with capillary fragility.
- Dermatologists and other practitioners should remain aware of the phenomenon, helping to avoid unnecessary investigation.
- Rumpel-Leede phenomenon self-resolves, with only supportive treatment required with no reported lingering effects to date.



INTRODUCTION

Rumpel-Leede phenomenon is a rarely diagnosed entity that can be seen in patients following the application of tourniquet-like forces to the extremities. This pathology represents the compromise of capillary walls within the dermis, leading to the formation of petechiae and purpura. If not properly identified, unnecessary testing, consultation and intervention can occur, leading to increased patient discomfort and risk for morbidity. In this report, we present a case of a patient who developed the Rumpel-Leede phenomenon following catheterisation of the right radial artery, where only five cases have been reported to date.

CASE REPORT

A 69-year-old female with a prior medical history of chronic hypertension, non-insulin-dependent diabetes mellitus and coronary artery disease presented to the emergency department with acute onset chest pain. Following further assessment, a diagnosis of an acute anterior ST-elevation myocardial infarction was made. The patient was stabilised and subsequently received the emergent percutaneous coronary intervention of the left anterior descending artery with stent placement. Access for the procedure was obtained via the right radial artery, with adequate haemostasis obtained with a pneumatic trans-radial compression band post-procedure. The patient received tirofiban, ticagrelor and heparin infusion during the periprocedural period. Post-procedure, she remained on dual antiplatelet therapy with ticagrelor and aspirin, with discontinuation of heparin and tirofiban.

One day after the procedure, the patient was noted to develop oedema of her right hand extending proximally to the elbow accompanied by red discoloration of her right hand. The patient denied pain, numbness, pruritus of the area or any previous occurrences of a similar rash and did not report any known allergic response to medications, adhesives, or topical agents. On examination, pinpoint petechiae coalescing into purpura were noted primarily on the dorsum of the right hand, with a sharp demarcation noted at the level of the patient's wrist, as seen in *Figures 1 and 2*. The patient's limb was neurovascularly intact with no motor, sensory or perfusion changes noted on the examination. With these findings, dermatology was consulted and the patient was diagnosed with Rumpel-Leede phenomenon. Given the non-evolving, benign nature of the patient's skin findings, a biopsy was not performed. Following supportive care during her stay in the hospital, the rash improved in the following four days without any additional intervention.

DISCUSSION

Rumpel-Leede phenomenon, known as acute capillary rupture syndrome, was first described by Drs Rumpel and Leede in 1909 and 1911 respectively, in patients with systemic conditions that resulted in vascular inflammation, such as scarlet fever and certain lymphomas^[1,2]. This phenomenon describes petechiae and purpura secondary



Figure 1.



Figure 2.

to venous compression and congestion, with its underlying aetiology involving the fragility of capillary vessels within the dermis^[2]. When venous obstruction occurs, an increase in hydrostatic pressure occurs within the capillary vasculature, resulting in the compromise of the fragile capillary vessel walls and extravasation of erythrocytes into the dermis^[1,3,4]. Some medical conditions can predispose an individual to develop the Rumpel-Leede phenomenon. Chronic medical conditions such as diabetes mellitus, chronic hypertension, hypercholesteremia, peripheral vascular disease, and systemic inflammatory diseases such as systemic lupus erythematosus and vitamin C deficiency have all been proposed to increase the risk of this phenomenon as a result of capillary fragility^[1,5]. This has also been found in systemic infection, especially in patients with scarlet fever, dengue fever and Rocky Mountain spotted fever. The usage of capillary fragility testing with tourniquet application in earlier medicine increased the risk of this phenomenon^[1,2-9]. In addition, patients with thrombocytopenia or platelet dysfunction are predisposed to capillary haemorrhage and petechiae formation. This includes iatrogenic causes of platelet dysfunction, such as in those receiving antiplatelet therapy, or those with thrombotic thrombocytopenic purpura and idiopathic thrombocytopenic purpura^[2,4,9]. However, in current literature, anticoagulation therapy has not been reported to increase the risk of Rumpel-Leede phenomenon.

Aside from predisposing factors, the main mechanical cause of Rumpel-Leede phenomenon is tightly fitting or repeatedly cycled sphygmomanometer cuffs, which result in decreased venous return and elevated venous pressure^[2,7]. Another cause that has been reported is tightly fitting sling-type baby carriers or tightly fitting undergarments or diapers in children. These result in tourniquet-like forces, resulting in petechiae formation most commonly in the lower extremities of these children, with a sharp demarcation noted where the child's limbs were encompassed by either the sling or the undergarment^[10]. A majority of these children do not have underlying vascular or platelet dysfunction, but the relative fragility of children's capillaries when compared to adults is the reason for its occurrence in this age group^[10].

Interestingly, only five cases of this phenomenon following radial artery catheterisation have been reported^[3-7]. In all cases, a similar mode of venous obstruction secondary to a radial compression band was noted, with some variation of presentation ranging from limited petechiae to large confluent purpura with blistering of the skin distal to the compression site. Given the current number of radial artery catheterisations for procedural access today, this phenomenon is relatively rare. This condition is self-resolved, with only supportive treatment required and no reported lingering effects.

CONCLUSION

The Rumpel-Leede phenomenon can raise great concern on the initial examination, especially if the examiner is unfamiliar with the pathology. However, it is important to know that the condition is benign in nature, and commonly resolves with only supportive care within one to two weeks from the initial insult^[2,3,10]. Given the benign nature of the phenomenon, it is possible that the phenomenon often goes unreported, as patients are normally asymptomatic. It is important to be aware of this condition to avoid unnecessary intervention, leading to better patient outcomes and a low risk of morbidity as a result.

REFERENCES

1. Duncan SC, Winkelmann RK. Early histopathology of the cutaneous capillary fragility test (Rumpel-Leede). *J Cutan Pathol* 1979;**6**:1-4.
2. Wang K, Lee J. Images in clinical medicine. Rumpel-Leede sign. *N Engl J Med* 2014;**370**:e1
3. Khoury Abdulla R, Safian RD. Rumpel-Leede phenomenon after radial artery catheterization. *Circ Cardiovasc Interv*, 2018;**11**:e006507.
4. Gui Y, Wang JY, Ye L, Pen G, Wang L. Coronary angiography causes Rumpel-Leede symptoms. *BMC Cardiovasc Disord*, 2022;**22**:332.
5. Rattka M, Rottbauer W. Rumpel-Leede sign after coronary angiography. *Dtsch Arztebl Int*, 2018;**115**:82.
6. Malik J. (2021). Rumpel-Leede phenomenon after right radial catheterization procedure. *Anatolian journal of cardiology*, 2021;**25**:E33.
7. Sud M, Madan M. Rumpel-Leede phenomenon: acute dermal capillary rupture complicating radial artery cannulation. *JACC Cardiovasc Interv*, 2018;**11**:1900-1901.
8. Hess AF, Fish M. Infantile scurvy: the blood, the blood-vessels and the diet. *Am J Dis Child*. 1914;**VIII**:385-405.
9. Gross AS, Holloway RJ, Fine RM. The Rumpel-Leede sign associated with drug-induced erythema multiforme. *J Am Acad Dermatol* 1992;**27**:781-782.
10. Ho VPY, Chong JH, Bishnoi P, Koh MJA, Wong SMY. Rumpel-Leede phenomenon – an alarming rash with benign etiology in 4 healthy infants. *Pediatr Dermatol* 2020;**37**:150-152.