

# HISTORICAL ASPECT OF RUMPEL-LEEDE AND OTHER SIGNS OF BLEEDING DIATHESSES

## RUMPEL-LEEDE VE DİĞER KANAMA DİYATEZİ İŞARETLERİNİN TARİHSEL YÖNÜ

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### Abstract

Various bands applied to the arm at the bedside occlude the arm resulting in petechiae and/or purpura in the distal forearm in patients with underlying conditions with altered platelet function or numbers or who have vascular fragility. Appreciating these findings is important as they may surreptitiously occur during clinical practice when a sphygmomanometer blood pressure cuff is applied; thus, their significance should be understood. The purpose of this review is to clarify misconceptions and seek clarity regarding the historical aspects of the performance of the Rumpel-Leede sign, test, or phenomenon and other signs and tests (Hess capillary resistance test, ligature sign, bandage sign, Grocco-Frugoni sign, or lace sign, and Weill-Chalier sign) designed to assess bleeding diathesis or vasculopathies causing increased capillary fragility in various diseases.

**Keywords:** Bleeding diatheses, medical eponyms, Rumpel-Leede sign, tourniquet

### Özet

Yatak başında kola uygulanan çeşitli bantlar; altta yatan, trombosit fonksiyonu bozulmuş/sayısı değişmiş veya vasküler frajilitesi olan hastaların ön kol distalinde peteşi ve/veya purpuraya neden olabilmektedir. Klinik uygulamalarda sfigmomanometre ile tansiyon ölçümleri sırasında gizlice ortaya çıkabileceği için bu bulgular önem arz eder ve

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dikkate alınmalıdır. Bu derlemenin amacı, çeşitli hastalıklarda artmış kapiller frajiliteye neden olan kanama diyatezi veya vaskülopatileri değerlendirmek için tasarlanmış Rumpel-Leede işareti, testi veya fenomeni ile diğer işaret ve testler (Hess kapiller direnç testi, bağ işareti, bandaj işareti, Grocco-Frugoni işareti, dantel işareti veya Weill-Chalier işareti) hakkındaki yanlış anlamaları, özgün kaynaklar ışığında gidererek konuyu tarihi açıdan netleştirmektir.

**Anahtar kelimeler:** Kanama diyatezi, Rumpel-Leede işareti, tıbbi eponimler, turnike

## Introduction

Before the advent of sophisticated laboratory studies, including coagulation tests (e.g., activated partial thromboplastin time, prothrombin time, thrombin time) and qualitative and quantitative assessments of platelet function, physicians devised bedside techniques to assess bleeding diathesis and diagnose disease. These diagnostic methods were eponymously named as signs to recognize and honor the person's accomplishment. The purpose of this review is to clarify misconceptions and seek clarity regarding the historical aspects of the performance of the Rumpel-Leede sign, test, or phenomenon and other signs and tests (Hess capillary resistance test, ligature sign, bandage sign, Grocco-Frugoni sign, or lace sign, and Weill-Chalier sign) designed to assess bleeding diathesis or vasculopathies causing increased capillary fragility in various diseases.<sup>1</sup> The eponymously named signs, tests, or phenomena are described chronologically based on the years they were initially reported in the author's own words.

## Description of Signs

The presence of multiple cutaneous forearm hemorrhages distal to the site of compression were first reported by Theodor Rumpel (1862–1923) in 1909 in cases of scarlet fever (Fig. 1):

These hemorrhages also occur spontaneously on the forearm and elbow regions where the exanthem is most dense and are arbitrarily produced by mechanical stimuli, especially by applying Biers compression bandage on the upper arm. This is useful in the differential diagnosis of scarlet fever. (...) [T]hey have not been observed, at a certain maximum pressure, in other infectious diseases such as measles, rubella, and diphtheria (p. 2297).<sup>2</sup>



**Figure 1:**  
**Theodor Rumpel (1862–1923)**  
(Public domain: [www.wikimedia.org](http://www.wikimedia.org))

Two years later, Carl Stockbridge Leede (1882–1964) (Fig. 2), an assistant under the direction of Rumpel, described the method for eliciting the petechial hemorrhage by what he referred to as the “congestion test”:

In each case, I determined the systolic and diastolic blood pressure and then filled the cuff to a pressure considerably below the diastolic pressure (usually 45–60 mm of mercury), leave the cuff with the tube disconnected, and examined the area within 5 minutes for bleeding (typically occurs in 5–20 minutes). (...) Only exceptionally has similar bleeding been observed by this method in other diseases which I have examined. Only in the case of measles did I obtain values which approached that of scarlet fever (p. 294).<sup>3</sup>

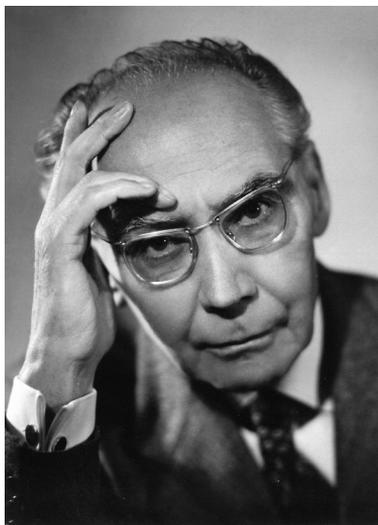
Thus, the test was initially intended as a method to assist in diagnosing scarlet fever.

The Grocco-Frugoni sign was published by Cesare Frugoni (1881–1978) (Fig. 3), associate professor and director, and Francesco Giugni, assistant at the Medical Clinic of the Faculty of Medicine in Florence, Italy, in 1911 as a method for detecting diseases with hemorrhagic diathesis.<sup>4</sup> In their publication they acknowledged Pietro Grocco (1856–1916) (Fig. 4) who recognized this finding four years previously and encouraged them to further to study its clinical and pathological significance.<sup>4</sup> The sign is performed as follows:

[a]n elastic ligature placed firmly around the arm causes hemorrhagic manifestations analogous to that occurring spontaneously elsewhere in a patient who presents with the cutaneous phenomenon of hemorrhagic diathesis. This phenomenon occurs during the



**Figure 2:**  
Carl S. Leede (1882–1964)  
(National Library of Medicine,  
Maryland)



**Figure 3:**  
Cesare Frugoni (1881–1978)  
(Public domain: [www.wikipedia.org](http://www.wikipedia.org))



**Figure 4:**  
**Pietro Grocco (1856–1916)**  
 (Public domain: [www.wikimedia.org](http://www.wikimedia.org))

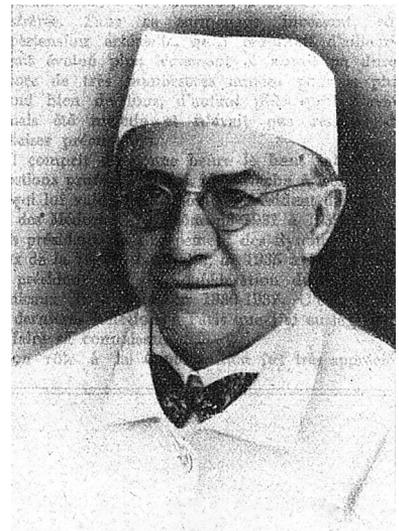


**Figure 5:**  
**Edmond Weill (1858–1924)**  
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period of maximum disease activity, decreases and disappears after the cause of the spontaneous hemorrhagic diathesis has resolved. This phenomenon, to which we have given the name the sign of the lace, is not only an excellent prognostic index but also an extremely valuable practical criterion (p. 25).<sup>4</sup>

Edmond Weill (1858–1924) (Fig. 5) and Joseph-Fortuné Chalier (1884–1942) (Fig. 6) were initially unaware of Frugoni and Giugni findings of the “lace sign”. They recognized the usefulness of this test particularly its value in diagnosing conditions in which joint disease precedes purpura and other disease in which there is vascular defects including scurvy:

Place the compressive bandage on the arm or thigh, taking care not to occlude or even reduce the caliber of the artery. (...) A number of punctiform spot first appear at the elbow bend followed by the forearm which then becomes more generalized sparing the palm and fingers. The forearm is overall purplish in color and the petechia are prominent. They are usually very close together and sometime confluent. Each are very small in dimension, present in isolation, and rarely exceed the dimension of a lens (p. 169).<sup>5</sup>



**Figure 5:**  
**Joseph-Fortuné Chalier (1884–1942)**  
 (Bibliothèque nationale de France, Paris)

Alfred Fabian Hess (1875–1933) (Fig. 7) and Mildred Fish in 1915 designed what has been referred to as “Hess test” or “capillary resistance test” as a method for diagnosing scurvy. Their approach was as follows:

[s]ubjecting the capillaries and vessels of the arm to increased intravascular pressure, by means of an ordinary blood-pressure band, and observing whether this strain results in the escape of blood through the vessels—the appearance of petechial hemorrhages on the skin. The vessels of normal infants were found to withstand, without apparent disturbance, 90 degrees of pressure for three minutes, whereas the vessels of infants suffering from scurvy gave way under this pressure. The test is not specific for scurvy, but is a method of demonstrating a weakness of the vessel walls, whatsoever may be its cause (p. 346).<sup>6</sup>



**Figure 5:**  
Alfred Fabian Hess (1875–1933) (Public domain: [www.prabook.com](http://www.prabook.com))

## Conclusion

The Rumpel-Leede sign and other signs and tests provide interesting historical examples of bedside techniques and applications developed to detect bleeding diatheses or capillary fragility. Leede, unlike other authors, provided a quantitative measurement of the amount of pressure and duration of compression for this test. A more recent report stated that the petechial rash in the Rumpel-Leede test occurs upon rapid release of pressure from a tourniquet or sphygmometer.<sup>7</sup> We were unable to find evidence to support this contention. Petechia have been most commonly described as occurring spontaneously and surreptitiously after a blood pressure cuff has been applied for noninvasive arterial blood pressure measurements.<sup>8–10</sup> Thus, it is incumbent that physician recognizes this phenomenon and its association with various conditions whose pathogenesis involves enhanced capillary fragility and/or thrombocytopenia.

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