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## **The effectiveness of BEMER physical vascular therapy in the condition after closed repositioning of right femoral shaft fracture. A case study**

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**Key words:** fracture, swelling, BEMER

### **Abstract**

Introduction. Blood vessels of microcirculation account for about 99% of the total count ( $10^{11}$ ) of an adult's blood vessels. According to the producer, BEMER Vascular Therapy is the most effective and most researched form of physical therapy available. The main objective of the study was to assess the usefulness of BEMER therapy in the correction of swelling after closed repositioning of right femoral shaft fracture.

Material. Female aged 64. Diagnosis: the condition after closed repositioning of right femoral shaft fracture using a femur nail Synthes Expert RFN 320 mm, 10mm.

Physiotherapeutic proceedings. The proceedings implemented on the second day following discharge from a hospital included: lymphatic drainage and kinesitherapy focused on upright standing, improvement of muscle strength in the lower limb, correction of movement deficit

in the hip and knee joint by means of PNF method. The proceedings performed from 06.02. to 22.03.2018 did not bring the expected results, therefore, on 23.03.2018 lymphatic drainage was replaced with general and local physical vascular therapy using the Bemer Classic apparatus.

Summary. The analysis of subsequent measurements revealed no progress in the applied physical therapy. The cause of failure in the correction of the swelling in the operated lower limb may be a short period of therapy lasting only eight days. Another cause may be too long nails connecting right femoral shaft fracture which may generate inflammation of the limb. The displayed therapeutic process in this case cannot be interpreted as a recommendation to apply or not apply the therapy and only a direction for further studies.

## **Introduction**

Blood vessels of microcirculation account for about 99% of the total count ( $10^{11}$ ) of an adult's blood vessels [1]. The circulatory system consists of 11.5% arteries, 14.5% veins, and 74% micro-vessels [2]. Microcirculation is composed of capillaries measuring in size ca. 6 pm in diameter. Every cubic millimeter of body contains 600 capillaries on average. The capillary network density may vary in human organs and tissues. The bigger digestion and oxygen demand, the larger capillary density. The speed of blood flow in capillary vessels is about 0.3 mm/s and the flow time in which diffusion is possible in the microcirculation area is ca. 2.5 s [3]. The issue of microcirculation has been investigated by: Klopp [4], Niemer, and Schulz [5], among others. On the basis of the relevant literature review, the use of BEMER physical vascular therapy in physiotherapy has been studied by, *inter alia*: Mrozkowiak [6-11], Michaeli [12], Bernat [13], Spodaryk [14], Rihova [15], and Mores [16].

According to the producer, BEMER Vascular Therapy is the most effective and most researched form of physical therapy available. BEMER therapy, including its comprehensive and complimentary use, improves the basic physiological processes, angiokinesis and vasodilatation of microcirculation, delivery of nutrients and oxygen to muscle cells. Due to

specific biorhythmic modulation, the synergistic effect is also achieved by primary and secondary, slightly bigger blood vessels. The impact can be also observed in the case of the immune system, protein synthesis and formation of endogenic antioxidants, thus ensuring an improvement of natural self-regulation mechanisms. In the night cycle, blood redistribution is intensified and so there are improved immunological processes, the regeneration and resuscitation processes are stimulated and the removal of excretory substances with urine is enhanced. The therapy has also positive effects on: the risk of injury and infection, anaerobic threshold, regeneration and recovery, performance, training intensity by reducing intervals between exercises, and it also optimizes the preparation for the competition. BEMER therapy is also successfully applied in the treatment of disseminated sclerosis[17].

The main objective of the study was to assess the usefulness of BEMER therapy in the correction of swelling after closed repositioning of right femoral shaft fracture.

## 2. Material

Female aged 64, weight 72.3 kg and height 171 cm, Image 1.

Diagnosis: the condition after closed repositioning of right femoral shaft fracture using a femur nail Synthes Expert RFN 320 mm, 10mm. Attention should be paid to the applied nails which are slightly longer than the cross-section of the bone, Image 2.

## 3. Physiotherapeutic proceedings

The proceedings implemented on the second day following discharge from a hospital included: lymphatic drainage and kinesitherapy focused on upright standing, improvement of muscle strength in the lower limb, correction of movement deficit in the hip and knee joint by means of PNF method. The proceedings performed from 06.02. to 22.03.2018 did not bring the expected results, therefore, on 23.03.2018 lymphatic drainage was replaced with general and local physical vascular therapy using the Bemer Classic apparatus, Image 3. The therapy of the whole body and limbs was conducted in accordance with the producer's recommendations and available publications which determined the time of real maintaining of therapeutic effects to be 12-16 hours [18-19]. It was assumed that BEMER therapy should be applied twice a day: locally on lymph nodes in the region of pelvis and lower limb from 04.00 p.m. to 04.20 p.m. in the daily cycle and generally from 10.00 p.m. to 05.30 a.m. in the night cycle. The signal parameters in the day cycle included: program P3, stimulus intensity 21 microtesla. The overall impact in the night cycle S was from 10.00 p.m. to 06.00 a.m. (10

microtesla). The signal covered the entire surface of the body including limbs while lying on the back and on the left and right side respectively. To verify the effectiveness of the applied proceedings, there was conducted the measurement of circumference of the healthy lower limb and the swollen one at five typical heights, using the orthopedic tape, namely: ankle height (1), 15 cm from the lower edge of the patella (2), knee joint (3), 10 cm from the upper edge of the patella (4), 20 cm from the upper edge of the patella (5).

#### 4. Results

The measurement results are displayed graphically, Table 1, Figure 1. The differences in subsequent measurements of all circumferences did not reveal any significant values and ranged within the tenths of a centimeter. Assuming the diagnostician's reliable approach to the measuring methods, it should be assumed that obtained values were within acceptable limits.

The values of all five circumferences of the right limb were larger than the left one. The ankle circumference (1) and 15 cm from the lower edge of the patella (2) insignificantly reduced. The size of the knee joint circumference (3) and 10 cm from the upper edge of the patella (4) increased, whereas the circumference at 20 cm from the upper edge of the patella did not change.

Table 1. Results of the measurements of circumferences in the lower left and right limb (n) 1

No.	Date	Place of measurement				
		1	2	3	4	5
		Lower left limb (healthy)				
0	23.03.18	23	33	37.5	48	55
Lower right limb (swollen)						
1	23.03.18	25.3	36.4	40	50.6	57
2	24.03.18	25.3	36.4	40	50.6	57
3	25.03.18	25.1	36.5	40.2	50.7	57
4	26.03.18	25.2	36.7	40.5	50.7	57
5	27.03.18	25	36.7	40.5	50.8	57
6	28.03.18	25	36.5	40.6	50.9	57
7	29.03.18	25	36.4	40.7	50.9	57
8	30.03.18	25	36	41	51	57

Source: Author's own research

#### 5. Summary

No reports concerning the effectiveness of physical vascular therapy in the swelling correction have been found in the relevant Polish literature available.

The analysis of subsequent measurements revealed no progress in the applied physical therapy. The cause of failure in the correction of the swelling in the operated lower limb may be a short period of therapy lasting only eight days. Another cause may be too long nails connecting right femoral shaft fracture which may generate inflammation of the limb. The displayed therapeutic process in this case cannot be interpreted as a recommendation to apply or not apply the therapy and only a direction for further studies.

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Image 1. Left lower limb (normal), swollen right limb



Image 2. X-Ray of the connection of right femoral shaft fracture.



Image 3. A set for BEMER physical vascular therapy. Mat for general therapy of the whole body and for applications of daily local therapy.

**Fig. 1 Results of measurements of the circumference of the left lower limb (normal) and of the right lower limb (swollen)**

