

ULTRASOUND VISUALIZATION OF THE TRIPLE LAYER SIGN OF LIPOHEMARTHROSIS: FAT, PLASMA, AND BLOOD

CHRISTIAN ROEHMER, MD, EVAN BERLIN, MD, AND STEPHEN SCHAAF, MD

CASE DESCRIPTION

Case Setting: Outpatient PM&R Clinic

- A 45-year-old female with a past medical history of T4 AIS A spinal cord injury, osteoporosis, and remote lower extremity fractures presented for evaluation of a left knee effusion. The patient had initially developed left knee swelling after suffering a fall, while transferring.

CLINICAL COURSE

- She first presented to her PCP, who ordered plain films, which revealed mildly displaced and impacted fractures of the proximal tibial metaphysis and fibular head.
- The patient then underwent a CT scan, which demonstrated a left lateral tibial plateau split fracture with extension into the tibial spines, along with numerous other remote and subacute fractures of her bilateral lower extremities.
- For further evaluation, ultrasound guidance was used to locate the left suprapatellar recess and overlying soft tissue structures in anatomic transverse and longitudinal views.
- The triple layer sign of a lipohemarthrosis was visualized, and showed clear separation and layering of marrow fat, plasma, and red blood cells.

DISCUSSION

- Lipohemarthrosis is the presence of blood and fat in a joint cavity and is indicative of an intraarticular fracture or severe capsuloligamentous injury.¹
- Ultrasound has been shown to be an effective modality to evaluate for lipohemarthrosis; if a fat-fluid level is seen, there is a high likelihood that a fracture is present.²

IMAGING

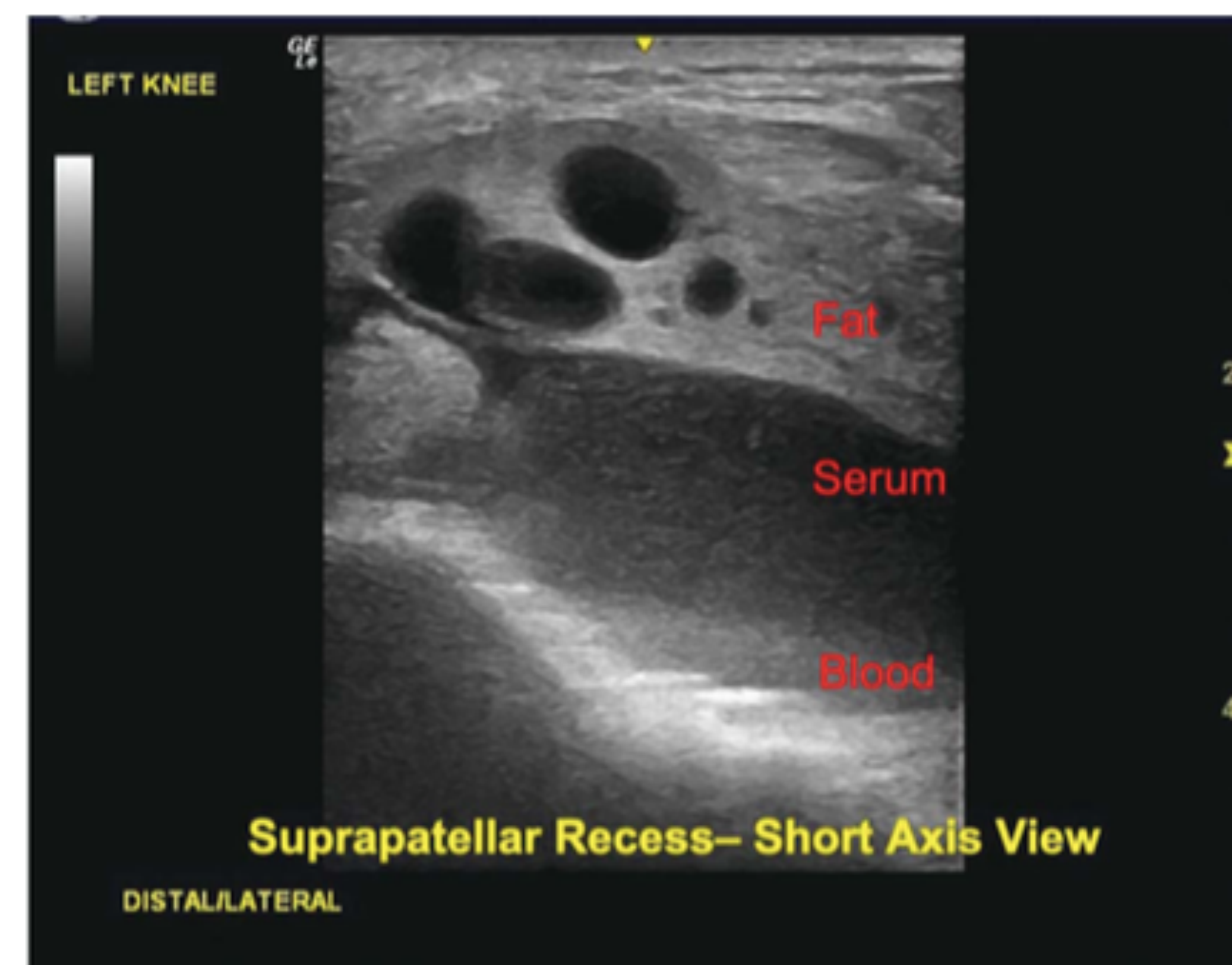


Figure 1. Ultrasound image of the left suprapatellar recess in an anatomical transverse view showing three distinct layers, from superficial to deep, of fat, plasma, and red blood cells, as indicated on the image.

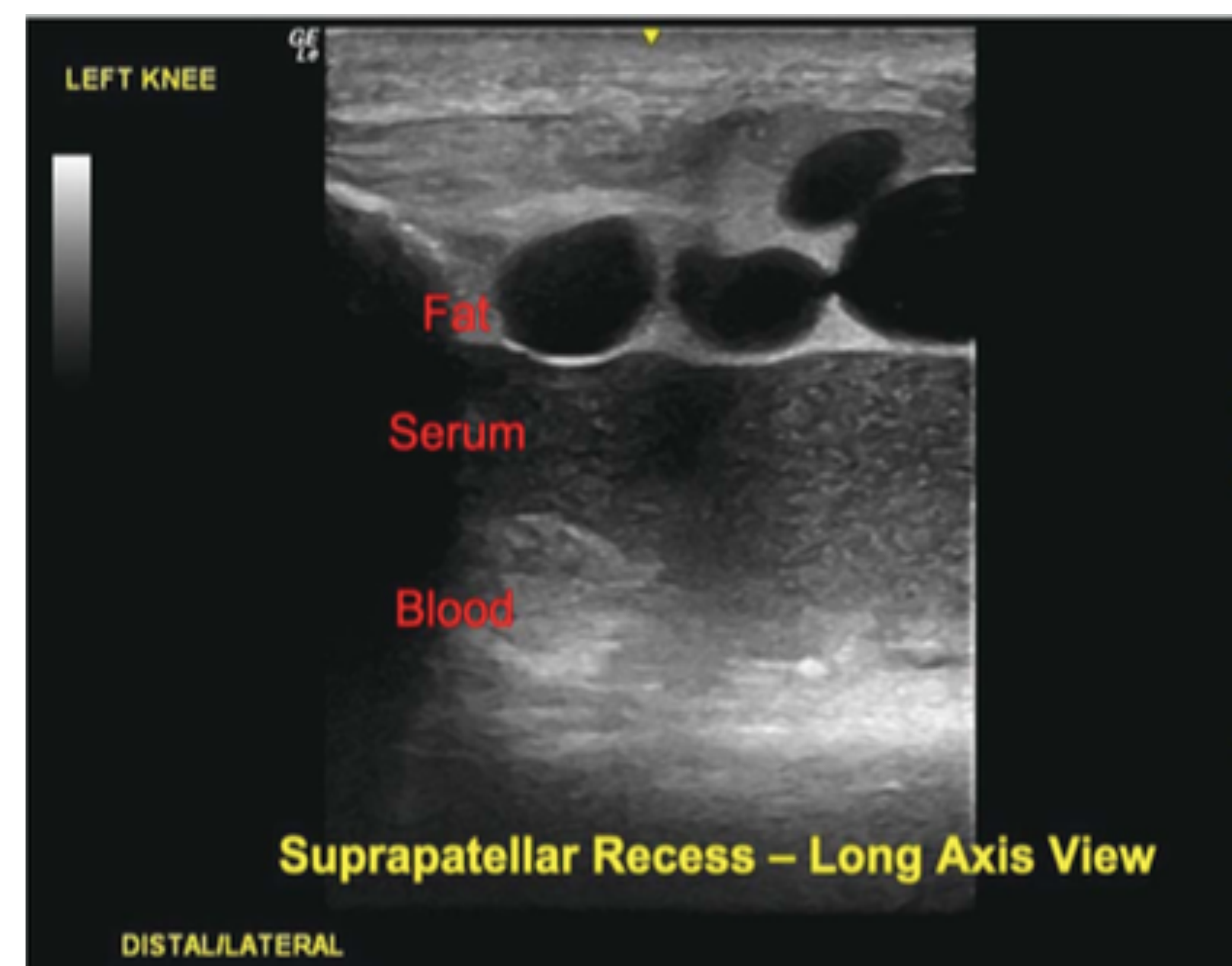


Figure 2. Ultrasound image of the left suprapatellar recess in an anatomical longitudinal view showing three distinct layers, from superficial to deep, of fat, plasma, and red blood cells, as indicated on the image.

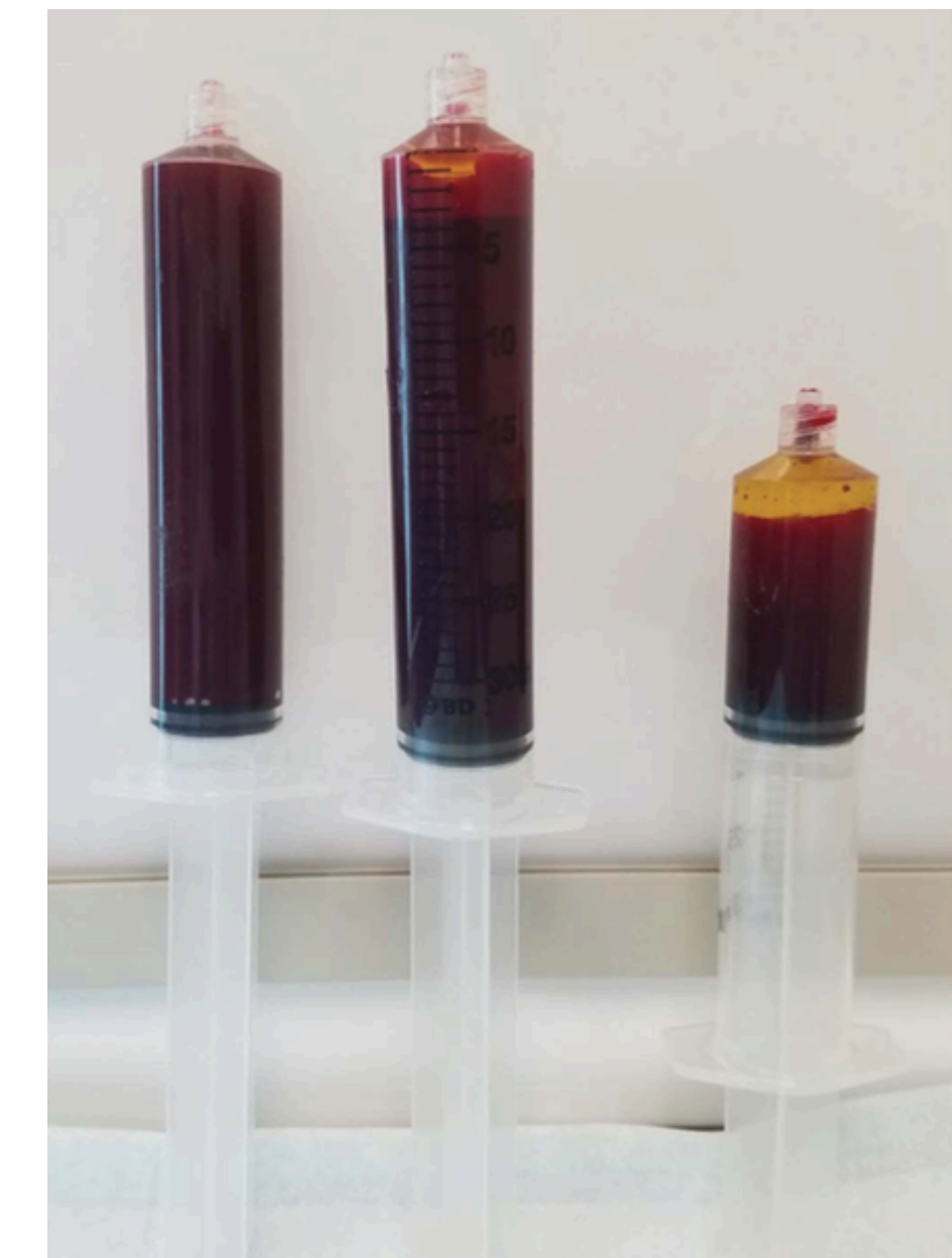


Figure 3. The 65 ml of fluid aspirated from the patient's knee. The order of aspiration was from left to right, and as you can see, the aspirate gradually demonstrating more lipoaspirate.

CONCLUSIONS

- Due to the relative scarcity of research addressing lipohemarthrosis within the outpatient setting, it is important for physiatrists to be aware of its findings.
- The triple layer sign secondary to lipohemarthrosis is visible under ultrasonography and can serve as a diagnostic tool in determining if fracture or severe capsuloligamentous injury is present.

REFERENCES

1. Aponte EM, Novik JI. Identification of lipohemarthrosis with point-of-care emergency ultrasonography: case report and brief literature review. *J Emerg Med.* 2013 Feb;44(2):453-6.
2. Bianchi S, Zwass A, Abdelwahab IF, Ricci G, Rettagliata F, Olivieri M. Sonographic evaluation of lipohemarthrosis: clinical and in vitro study. *J Ultrasound Med.* 1995 Apr;14(4):279-82.