Aggarwal AK, Shashikanth VS, Marwaha N. Platelet-rich plasma prevents blood loss and pain and enhances early functional outcome after total knee arthroplasty: a prospective randomised controlled study. International Orthopaedics 2014; 38:387–395

Design: In the setting of total knee arthroplasty (TKA) , does the intra-operative use of platelet rich plasma (PRP) reduce postoperative blood loss and hasten functional recovery from the operation?

Population/sample size/setting:

- 40 patients (mean age 57, gender not reported) undergoing either unilateral or bilateral TKA at a postgraduate orthopedic surgery department in India
- Inclusion criteria were primary TKA or the first stage of a planned two-stage TKA where the second stage was scheduled at least six weeks after the first stage
- Exclusion criterion was preoperative hemoglobin below 10g/l

Interventions:

- Unilateral (n=21) and bilateral (n=19) TKA were analyzed separately
- Randomization was to either PRP or no PRP intra-operatively
    - PRP was given to 10 bilateral and to 7 unilateral TKAs
    - No PRP was given to 9 bilateral and to 14 unilateral TKAs
    - PRP was prepared from 50 ml of the patient's blood and centrifuged for 15 minutes at 1500 RPM; the leukocytes were filtered, and 8 ml was used in each knee along with calcium chloride for activation
    - All operations were done by the same surgeon under regional spinal/epidural anesthesia with a cruciate-sacrificing cemented prosthesis
- Postoperatively, the knee was immobilized for 24 hours with a bulky dressing
- The same postoperative analgesia and antimicrobial regimen was given to all patients
- Similar physical therapy was advised for both groups, with

Outcomes:

- The primary outcomes were related to blood loss: postoperative hemoglobin and need for transfusion
- Several secondary outcomes were assessed by an independent observer: WOMAC scores, Knee Society Scores (KSS), and range of motion (ROM)
- Blood loss was less in the PRP group for both unilateral and bilateral TKA
    - The mean number of units of blood transfused was 1.00 for the bilateral TKA who had PRP, but was 2.22 for the no-PRP group

    - The mean number of units for the unilateral TKA was 0 units in the PRP group and 0.93 for the no-PRP group
    - On postoperative day 3, the mean hemoglobin was 9.62 in the bilateral group which had PRP and 7.60 for the bilateral group with no PRP; for the unilateral TKA groups, the postop day 3 hemoglobins were 10.49 and 9.72 respectively
- Most of the secondary outcomes favored the PRP group, with fewer narcotics, lower pain scores at 6 and 12 weeks, better WOMAC scores at 6 weeks and 3 months, and better ROM at 6 weeks
    - Wound healing as assessed by a wound score form did not significantly differ between groups, and only one patient in the control group had a deep infection

Authors' conclusions:

- PRP administered during TKA reduces blood loss, postoperative pain, and the need for narcotics compared to no PRP, and leads to earlier regaining of function
- Local application of PRP can be recommended during TKA to reduce blood loss and pain

Comments:

- Although the decision to transfuse blood could potentially be influenced by knowledge of which patients had PRP, the measurements of hemoglobin are not biased by that knowledge, and the conclusions regarding blood loss are probably not biased
- The allocations were made by opening an opaque envelope intra-operatively, which preserves the principle of allocation concealment
- The authors refer to PRP as a gel, but it appears to be leukocyte-free centrifuged blood with calcium chloride for activation
- The concentration of platelets, a potentially important consideration in preparation of PRP, is not specified
- It was recently reported (Yoshihara 2014) that there have been changes in the past decade with respect to blood management during total hip and knee replacements, with decreased use of predonated autologous blood and increases in the use of allogeneic blood, with total levels of blood transfusion not changing; this study, if replicated, has the potential to offer an alternative to both predonated and allogeneic blood in the setting of TKA, especially when bilateral operations are done

Assessment: Adequate for evidence that in the setting of TKA, intraoperative use of PRP can reduce blood loss, improve levels of postoperative hemoglobin, and reduce the need for blood transfusions by the third postoperative day, and this may improve pain control and promote earlier return to function

Reference:

Yoshihara H, Yoneoka D. National Trends in the Utilization of Blood Transfusions in Total Hip and Knee Arthroplasty. J Arthroplasty 2014; 29:1932–1937.