

Improving Total Hip and Knee Arthroplasty Outcomes through Pre-operative Anemia Optimization

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Introduction

The prevalence of pre-operative anemia is about 30-40% and has been shown to be an independent risk factor for poorer operative outcomes and perioperative morbidity and mortality. Blood transfusion increases risk of post-operative infections, prolonged hospitalization, circulatory overload, and thromboembolic events. Iron deficiency is the leading cause of pre-op anemia and can be treated with iron replacement. Pre-operative anemia, which is often overlooked, increases risk of post-operative complications.

Practice Question

In Total Hip and Knee Arthroplasty Patients, does identifying and treating anemia pre-operatively (compared to the common practice of proceeding with surgery with untreated anemia) improve surgical outcomes?

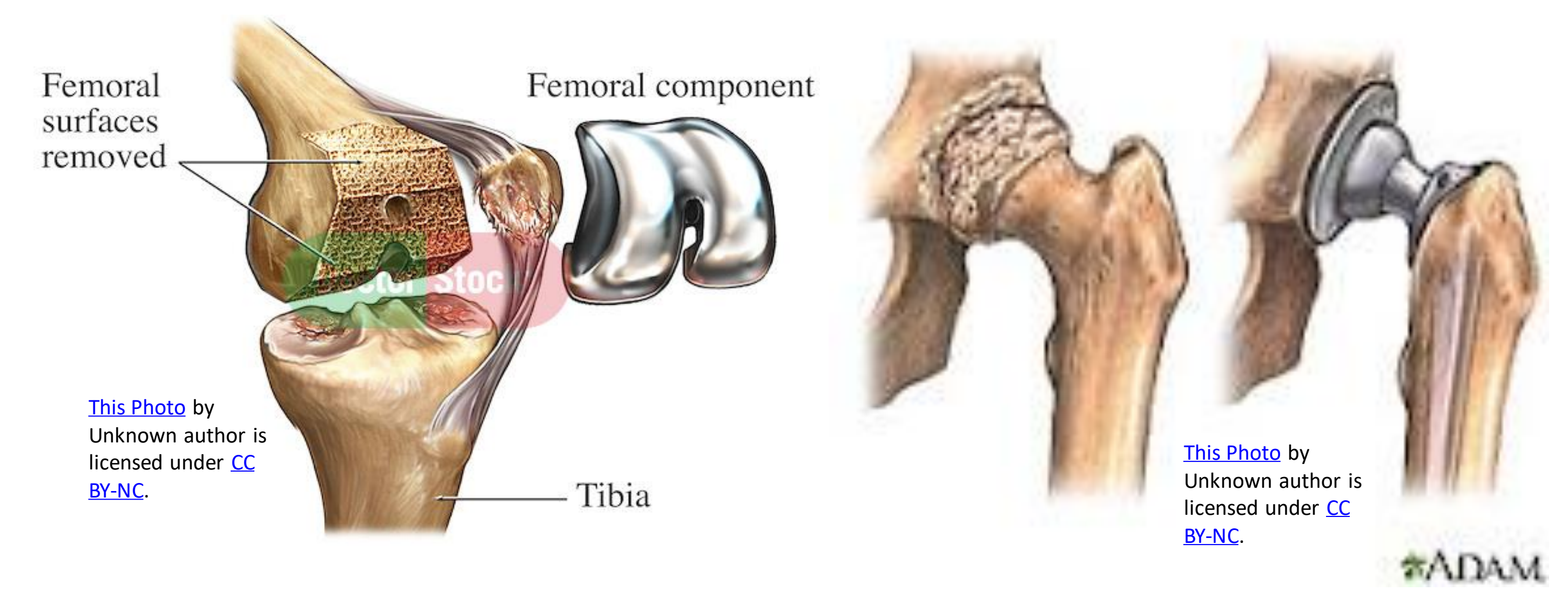
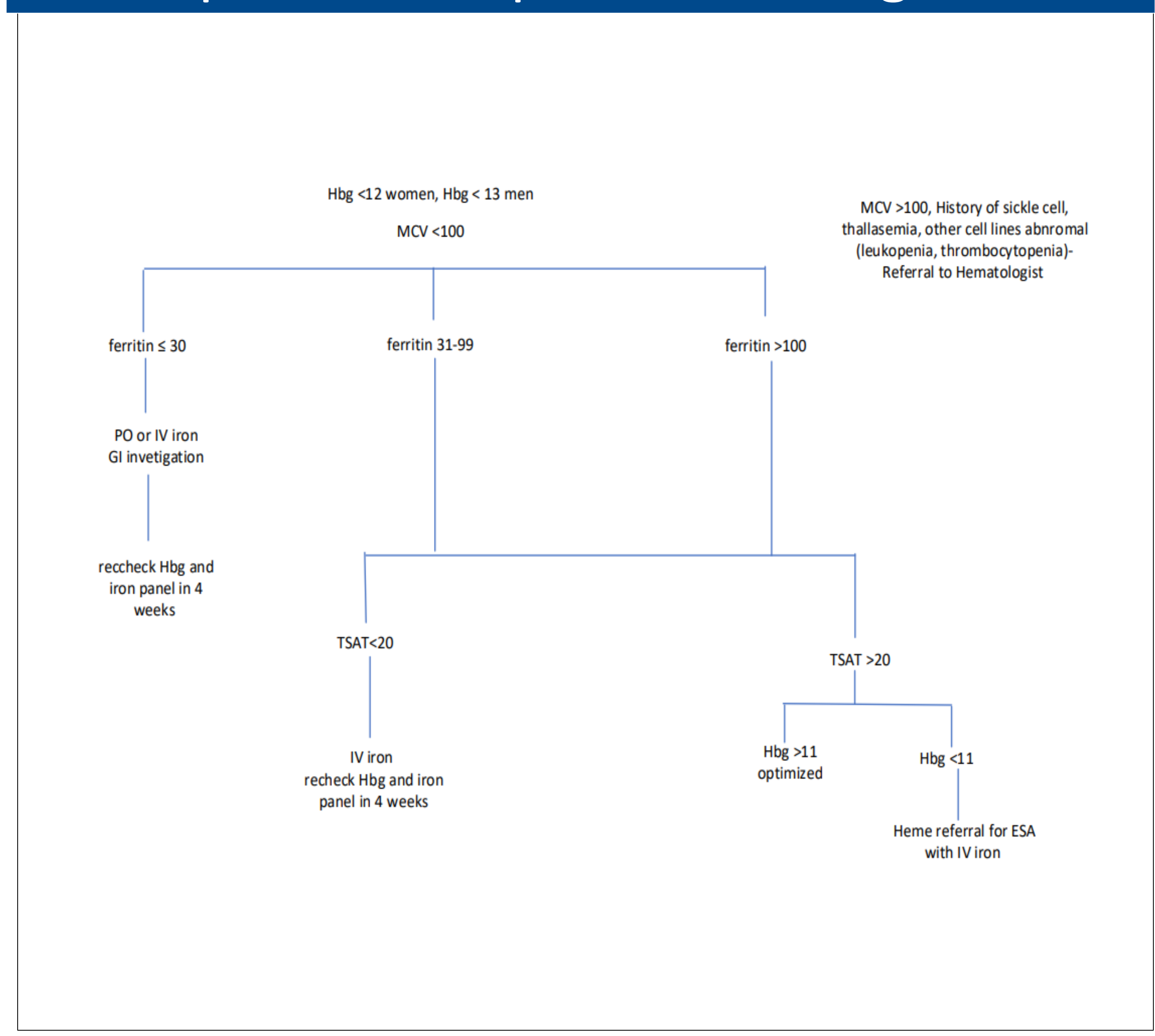
Search Strategy

PubMed, CINAHL, and Cochrane databases were queried and screened for relevance. Articles available in English from 2017-2023 that addressed pre-operative anemia or PBM, and hip and total knee arthroplasty were included. Articles with hip fractures and other hematological disorders such as sickle cell and hemophilia were excluded. Articles that did not specifically adjust for the effects of other peri- and post-operative PBM strategies were also excluded. Results of a ham search included 2 additional articles.

Evidence

102 citations were found. 13 articles met the inclusion criteria and were reviewed. There was one level IA randomized controlled study, two level IIIA systematic reviews of experimental and non-experimental studies, eight level IIIA cohort studies, and two-level VA expert opinion articles.

Pre-op Anemia Optimization Algorithm



Synthesis

There is good but inconsistent evidence that pre-operative anemia optimization reduces the risk of blood transfusion with two systematic reviews and seven individual cohort studies supporting this conclusion.^{1,2, 4, 5, 7-11} There was only one randomized controlled study that met the inclusion criteria.¹² This study showed no improvements in blood transfusion rate. Another cohort study found treating pre-operative anemia treatment did not significantly reduce blood transfusion, especially when compared to the drastic reduction in blood transfusion rate with the use of TXA.¹³ There is insufficient data on other surgical outcomes. There was significant heterogeneity in definition of anemia, treatment modalities, duration of treatment, and transfusion triggers across the articles.

Translation

Pre-operative anemia optimization is a cumbersome process with high quality evidence lacking regarding its effect on surgical outcomes. More research is needed to determine the best treatment modalities. Enteral iron is the most cost-effective and accessible but is poorly absorbed and tolerated with slow and poor rise in Hgb.³ Parenteral iron has been shown to be safe and effective in replenishing iron stores with a rapid Hgb response though cost and access barriers make it difficult to administer. ESAs are indicated for treatment of functional iron deficiency and iron sequestration in ACI and have been shown to have good response but are associated with an FDA warning for thrombosis risk.³ A pre-operative anemia program following an algorithm-led approach can be implemented to further assess the value of pre-operative anemia optimization.

Implementation

In our Total Hip and Knee Arthroplasty Program, screening for pre-operative anemia starts when the patient becomes a candidate for surgery. Treatment modalities are followed based on an algorithm that determines the type of iron deficiency. Currently the anemia program is essentially run by one Nurse Practitioner who sends referrals for IV iron and ESA to an outside Hematologist office. We hope to eventually establish an in-house anemia clinic staffed with a Hematologist, which would streamline this process and reduce access barriers. As we finetune the algorithm, we plan to perform a prospective study on surgical outcomes.

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