Perioperative Management of a Patient With a Familial History of a Thrombophilic Disorder- A Case Study

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Purpose

The purpose of this case study is to demonstrate the importance of a thorough preoperative history, the steps necessary in identifying a protein S deficiency (PS deficiency), and perioperative measures recommended to mitigate the associated risks of venous thrombotic event (VTE) and pulmonary embolism.

Literature Review

The prevalence of patients with a PS deficiency that experience VTE ranges from 1-7.4% (1-3). It is suggested that 5-8% of young adults experiencing their first VTE will have been diagnosed with heterozygous PS deficiency (4). Although this may appear minimal, the outcome of a VTE can have life-threatening consequences.

When protein S is deficient, activated protein C (APC) no longer breaks down clotting factors Va and VIIIa (Figure 1), potentially leading to postoperative complications such as VTE and pulmonary embolism (5).

PS deficiency presents as a congenital or acquired disease (6). The congenital form can be categorized into three subtypes. Type I, the most common form, is due to insufficient concentrations of bound and free protein S. Type II is a result of malformed protein and Type III occurs due to decreased protein S activity (3,7). PS deficiency can also be acquired. It is most commonly the result of oral contraceptives, prolonged vitamin K-antagonist therapy, pregnancy, and chronic infections (3).

The heritability of first and second degree relatives of previously indexed patients identified 37% of relatives also presented with PS deficiency, 29% of which experienced previous VTE's. Additionally, 50% of those were a direct result of predisposing factors such as surgery, trauma, or extended immobilization (8). Consequently, it is recommended that laboratory screenings be performed among family members of symptomatic/indexed patients to allow for counseling of identified carriers (9).

For patients with established PS deficiency considering surgery, protocols of pharmacologic and nonpharmacologic strategies should be utilized (8) (Table 1).

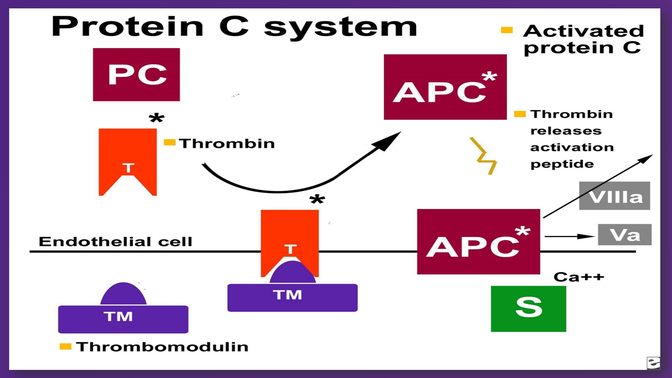

Figure 1: Role of protein S in the protein C system (5).

Patient status and duration of prophylaxis	Risk stratum'			
	Low (0-1 risk factor points)	Medium (2 risk factor points)	High (3-4 risk factor points)	Very high (≥5 risk factor points)
Inpatient	No prophylaxis	Beginning first day postoperative and continue throughout hospitalization: enteric coated ASA 325-650mg orally every 12h, if ASA contraindicated, then UFH 5000u SC every 12h	Beginning first day postoperative and continue throughout hospitalization: enteric coated ASA 325-650mg orally every 12h, if ASA contraindicated, then UFH 5000u SC every 12h or LMWH SC daily	Beginning preoperative or within 12h postoperative, UFH 5000u SC every 8h or LMWH SC daily
Outpatient surgery or upon discharge	No prophylaxis	Enteric-coated ASA 325-650mg orally every 12h, if ASA contraindicated, then no pharmacologic prophylaxis	Enteric-coated ASA 325-650mg orally every 12h, or UFH, or LMWH preoperative or immediately postoperative, or LMWH beginning on the first postoperative day	LMWH SC daily or immediate total or partial weight bearing with ankle range of motion and ASA 325-650 mg orally every 12h
Duration	No prophylaxis	While hospitalized, up to first postoperative visit, then decide whether to extend 7-14 days	While hospitalized up to 7-14 days postoperative, then reassess	While hospitalized up to 10-14 days postoperative, continued while immobilized

Table 1: Pharmacological and nonpharmacological strategies associated with VTE risk (8).

Case Study

A 30-year-old female presented to the clinic complaining of a painful lesion affecting her right foot (Figure 2). Clinical and radiographic evaluation confirmed an intractable plantar keratoma secondary to a contracted 3rd digit with resultant plantarflexed metatarsal. The lesion was unresponsive to conservative treatment for greater than one year. The patient's past medical history was significant for cigarette smoking (one pack/day), penicillin allergy, obesity, and a familial history of a proteinase coagulopathy disorder associated a VTE, identified as a PS deficiency. Based on her medical history, testing was indicated. The patient's protein S antigen level was abnormally low at 11 mcg/ml (normal reference range 13-32 mcg/ml), confirming the presence of a Type I heterozygous PS deficiency. Pre-op PT/PTT and CBC were within normal limits. The surgical plan and lab results were discussed with the patient's primary care physician. The patient was medically cleared for surgery but classified as a medium-high risk based on the PS deficiency (Table 1).

To reduce the risk of VTE, 5000 units of heparin was delivered subcutaneously preoperatively. The surgical time was kept to a minimum. A tourniquet was applied but never elevated during the procedure. The procedure included sequential soft tissue reduction of the contracted digit and a chevron osteotomy of the distal third metatarsal with pin fixation (Figure 3).

Postoperatively, the patient was prescribed 325 mg of aspirin BID for seven days and encouraged to move her extremities. Suture and pin removal followed standard protocols. The patient wore a post-op shoe for six weeks before returning to normal shoewear. Serial radiographs demonstrated consolidation of osteotomy site. The patient progressed through the postoperative period free of any complications with resolution of the lesion. Six months postoperatively, the patient presented with acute swelling and pain associated with the left lower leg. Clinical and diagnostic studies confirmed a VTE. The patient was admitted to the hospital for anticoagulation therapy. The VTE was felt to be coincidental rather than directly related o the surgery. Following the resolution of her deep venous thrombosis, she was managed with long-term oral anticoagulation therapy without recurrence in three years of follow-up.

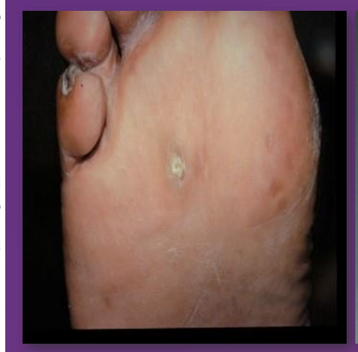

Figure 2: Painful hyperkeratotic leasion sub 3rd metatarsal head, right foot.

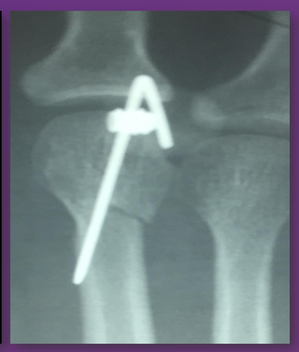

Figure 3:Chevron osteotomy of the 3rd metatarsal with pin fixation, right foot.

Analysis & Discussion

PS deficiency is a heritable disorder affecting more than 30% of family members of diagnosed patients (8). Many of these patients will be completely naive to this condition until they experience an adverse event. To avoid missing a hypercoagulopathy, a thorough medical history including family history must be acquired, with special detail toward any prior incidence of VTE. Due to this patient's family history and possible consequences of an undetected deficiency, a serum antigen assay was performed, revealing insufficient plasma protein S levels. It is important to note that the specific assays and molecular studies ordered in the diagnosis of PS deficiency is still an area of debate (3). The authors believe this highlights one of several aspects of this disorder that requires further investigation.

Once diagnosed, should surgery be considered based on risk assessment, a method of prophylaxis should be chosen. In the current case, 5000 units of UFH was administered subcutaneously prior to surgery with aspirin prescribed postoperatively. This is one of several options believed to be effective (10,11). Minimizing surgical time, avoiding tourniquet use, and encouraging movement of the extremities after surgery are additional preventive measures.

This case illustrates the importance of recognizing PS deficiency, steps to identify it, and the perioperative interventions to consider with the goal of patient safety. Patient education on the consequences of a PS deficiency is warranted.

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