

Intraoperative Bleeding Associated with Preoperative Use of *Ganoderma lucidum* Supplements

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Abstract

Reishi mushroom, also known as *Ganoderma lucidum*, is a type of edible medicinal fungi that is found throughout Asia. Recent research has shown that it may also have antiplatelet activity that is similar to aspirin. Likewise simvastatin has been shown to inhibit platelet aggregation. In addition, montelukast has anecdotally related to one case of acquired thrombopathia and may interfere with platelet aggregation. We report a case of intraoperative hemorrhage with laparoscopic trocar placement and dissection in a patient concomitantly taking *Ganoderma lucidum* supplements, simvastatin and montelukast. The hemorrhage only responded to a transfusion of platelets. We believe this is the first report associating *Ganoderma lucidum* products with an intraoperative hemorrhage. We recommend that patients who are on simvastatin, montelukast or an anticoagulant should refrain from taking *Ganoderma lucidum* products for seven days prior to surgery.

Keywords

Reishi Mushroom, *Ganoderma lucidum*, Simvastation, Montelukast

1. Introduction

Reishi mushroom, also known as *Ganoderma lucidum*, is a type of edible medicinal fungi that is found throughout Asia [1]. Recent research has shown that it may also have antiplatelet activity that is similar to aspirin [2]. Likewise simvastatin has been shown to inhibit platelet aggregation [3]. In addition, montelukast has anecdotally related to one case of acquired thrombopathia and may interfere with platelet aggregation [4]. We

report a case of intraoperative hemorrhage with laparoscopic trocar placement and dissection in a patient concomitantly taking *Ganoderma lucidum* supplements, simvastatin and montelukast, all of which have a possible anticoagulant effect.

2. Case Report

A 64-year-old Vietnamese female found to have squamous cell cervical cancer was scheduled for a robotic radical hysterectomy. Patient had a past medical history of asthma, hypertension and dyslipidemia for which she took montelukast, albuterol, captopril and simvastatin. She denied taking any supplements. She had no history of bleeding or easy bruising. Her preoperative coagulation studies were all within normal limits as the prothrombin time was 12.7 (control 12.1 - 14.8), partial thromboplastin time was 34.0 (control 24.0 - 34.2) and the INR was 0.9. Her preoperative platelet count was 219,000.

She was brought to the operating room, general anesthesia was induced and the procedure was begun. It was immediately noticed that all sites of dissection and trocar sites were hemorrhaging despite the use of cautery and other attempts to promote hemostasis. The surgeon (B.C) decided to abort the laparoscopic approach and convert to an open procedure as the patient had lost 400 ml of blood with little control of diffuse bleeding in a very short period of time. Upon deflation of the pneumoperitoneum, the bleeding dramatically increased. Neither thromboelastography nor rotational thromboelastometry were available. Fresh frozen plasma was administered but there was no improvement in the hemostasis. Then, after the patient received 10 pack of platelets, clot formation was visualized and the bleeding stopped. The estimated blood loss was 1400 mL which was replaced by three units of packed red blood cells. Patient remained intubated for 24 hours for further cardiovascular monitoring. She had post-operative bleeding from the wound edges that required cautery for hemostasis, which the surgeons believed was consistent with a platelet defect. She had no other further episodes of bleeding.

Postoperatively, upon further questioning, she admitted to have been taking two *Ganoderma* products which she had denied to the involved clinicians preoperatively. She was specifically asked about herbal and vitamin preparations. She did not consider her intake of these Reishi mushroom products to fall into one of those categories. She took each *ganoderma* products, on alternate days according to the recommended doses. One product was “Concord Sunchih Dietary Supplement: 2 in 1 herbal formula with *Ganoderma reishi* Mushroom extract 10:1 and *Ganoderma lucidum* spore”, manufactured by International Trading Co Concord Health Group, Sydney Australia and distributed by the C& L International Trading Inc., New York, NY. The labelled dosage is 225 mg of *Ganoderma lucidum* mushroom extract and the dosage of *Ganoderma* spore powder is 75 mg. Its “serving size” is labelled as one capsule. The other product was the “Eu Yan Sang “Extra Strength Lingzhi Cracked Spores Capsules” in which each capsule contains Reishi Cracked Spores 240 mg and Reishi Sporophore Extract 60 mg. The recommended dose on the package was “Take 2 capsules with lukewarm water twice daily before meals.” While unusual, this herbal supplement has not yet been associated with massive intraoperative hemorrhage. Postoperatively, the patient and her family also reaffirmed that she had no significant bleeding history. Patient was discharged home without any further complications. Patient had no further episodes of bleeding in the following year and did well otherwise.

3. Discussion

Reishi mushroom, also known as *Ganoderma lucidum*, is a type of edible medicinal fungi that is found throughout Asia. For at least 2,000 years, it has been a popular herbal medication thought to promote longevity and eternal youth [5]. It is available as a fresh or dried mushroom as well as in concentrated pill form. It is believed to have analgesic [6], antifungal [7] [8], antiviral [7], cardiovascular [9], anti-diabetic [10]-[13] and anti-tumor [14]-[16] effects. It is usually taken to lower blood pressure, prevent cancer, and enhance the immune system. Recent research has shown that it may also have antiplatelet activity that is similar to aspirin [2] [17].

Reishi mushroom’s antitumor, antihypertensive, antioxidant and antiplatelet effects seem to be due to its active pharmacological components; adenosine, beta glucans, triterpenoids and polysaccharides. In fact, a study by Tao *et al.* [2] explored the inhibitory effect of Reishi mushroom on platelet aggregation in 15 healthy volunteers and 33 patients with atherosclerotic disease. They showed a direct dose dependent inhibitory effect on platelet aggregation due to these polysaccharides. This inhibition mainly occurred in the first and second phase of aggregation [2] [3].

We considered the possible causes of the unexpected massive intraoperative hemorrhage. While both monte-

lukast and simvastatin have listed thrombocytopenia as a possible complication, this patient was not thrombocytopenic. Therefore, a quantitative platelet deficiency was considered not to cause the hemorrhage. Likewise, the administration of the fresh frozen plasma also had no effect on the hemorrhage, a deficiency in clotting factors was also considered unlikely. As the hemorrhage stopped shortly after the administration of the platelets, we considered this strong evidence that the patient had a qualitative platelet dysfunction.

As we were unfamiliar with the *Ganoderma lucidum* products the patient had been using, we initially thought they were the sole source of the clinically significant bleeding. While this could be the case, this massive hemorrhage would have been observed previously especially since the patient was taking the recommended doses of the *Ganoderma lucidum* products. However, we could find no previous report of hemorrhage in the literature due to these products. Furthermore, there is a study by Yung Kwok *et al.* showing that *Ganoderma lucidum* ingestion was not associated with hemostasis impairment, abnormality of platelet function analyzer PFA-100 nor thromboelastography [18]. We also considered that the bleeding may have been due to one of the products containing an excessive amount of the active anti-platelet ingredient and there was a quality control issue with one of the products. This overdose possibility may be considered more likely if other reports of hemorrhage appear in the literature associated with these specific products. We also considered the possibility that other medicines the patient was taking could have also contributed to the platelet dysfunction and the bleeding. The patient reported taking monelukast (Singulair[™]), albuterol and simvastatin. While these authors could not find literature associating thrombopathia with albuterol, there is a report by Duchemin *et al.* associating montelukast with acquired thrombopathia [4]. Likewise, simvastatin has an inhibitory effect on platelet activation and aggregation [3]. While her dosages of her ganoderma supplements were within the recommended range, we hypothesize that her platelets may have had a qualitative platelet defect because of the simultaneous use of montelukast, simvastatin and ganoderma supplements.

More patients are utilizing herbal medications to promote health. Patients undergoing surgery are more likely than the general population to be using herbal medicines [19]. Furthermore, somewhat similar to this patient, women and patients between the age of 40 and 60 years old are more likely to use herbal medicines [20]. Furthermore, the 56% of patients in that study did not inform the anesthesiologist before surgery that they used herbal medicine.

4. Conclusion

Reishi Mushroom products should be taken with caution in patients before surgery especially those who are taking other drugs with anti-platelet effects. We believe that a reasonable precaution would be to avoid the use of *Ganoderma lucidum* products for seven days prior to surgery if the patient is also taking simvastatin, montelukast or an anticoagulant.

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