“Maras Powder” a Form of Smokeless Tobacco as a Perioperative Risk Factor in Microsurgery

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Case Report

Case 1

Introduction

“Maras powder” is a form of smokeless tobacco that is commonly used in the South and Southeastern parts of Turkey. It is made from the leaves of *Nicotiana Rustica* L., which is dried, powdered and then mixed with ashes of wood from oak, walnut and grapevine. The moisturized powder is applied to the labial sulcus for a duration ranging from 5 min to hours and repeated several times during the day. Although sometimes it is used as an alternative during quitting smoking, it often is used as an independent substance due to its higher addictive properties.

In this paper we describe two cases of microvascular flap loss that are associated with the use of “Maras powder”. One was because the patient went into withdrawal, delirium and agitation resulting in tearing of the microvascular anastomosis. The other was due to continued use of the powder by the patient in the postoperative period resulting in flap necrosis. The cases have never been reported in English literature.

A 47-year-old man sustained a close range shotgun injury to his trunk and anterior face. After initial evaluation and stabilization at an outside hospital where he received a tracheostomy and a chest tube, the patient was transferred to our hospital. During the examination the anterior mandible, anterior floor of the mouth, and superior two thirds of the lower lip were missing. The palate was fractured and was in 3 pieces. Glasgow coma scale was 15 and the patient was fully alert and cooperating although he was not able to speak because of his mandibular trauma. Five days after the accident the patient underwent reconstruction of the mandible, floor of the mouth, and lower lip with a free fibular osteocutaneous flap. The anastomosis of the artery and vein were done to the superior thyroid artery and external jugular vein respectively in an end-to-end fashion using 8–0 nylon sutures. The flap was monitored with arterial and venous signals detected over the flap, and the flap tonus, color and temperature were good. In general the patient was a calm person and was tolerating the operation well. Sixty hours after the operation the patient started having a sudden change in the mood with hallucinations, agitation, excitement, restlessness and started physically attacking his family members. The patient removed his cast from the donor site and foley catheter by himself. He also attempted to remove the right chest tube. On his physical examination his heart rate was 120 and blood pressure was 170/100 mmHg. He was also confused and sweating profusely. Psychiatry was consulted and the patient was started on diazepam and haloperidol. Within 12 h of the event the venous signal was lost in the flap. The patient was emergently taken to the operating room for exploration. The venous anastomosis was irreparably and raggedly torn with the tear extending to the recipient vein, and there was a large thrombus spanning

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the anastomosis. The anastomosis was redone 3 times, but thrombi kept on forming possibly because of the general intimal damage. The arterial flow was adequate and leeches were applied in an unsuccessful attempt to salvage the flap. After a detailed interview with his family it was found that the patient had been actively and intensely using “Maras powder” for over 10 years.

Case 2

A 60-year-old man with diabetes mellitus for over 20 years had a plantar ulcer for nearly 3 years. The ulcer was 7×8 cm involving the plantar skin and ranged from his calcaneal area to his forefoot area. There were no signs of osteomyelitis or Charcot changes in the joints. After an angioplasty where both the tibialis anterior and posterior arteries were opened, a free anterolateral thigh flap for salvage of the foot was performed. The artery was anastomosed to the posterior tibial as flow through and the vein was anastomosed to the venae comitantes in an end-to-end fashion using 9–0 nylon sutures. The arterial and venous signal was strong over the flap and the color, tonus ad temperature were good. On the 12th postoperative day the patient started having signs of flap ischemia even though the arterial and venous signals were good. The flap rapidly deteriorated in 24 h and necrosis developed over the entire flap in 48 h. There was no anastomotic failure as the arterial and venous signals were good until the flap became fully necrotic. Patient later admitted that he started using “Maras powder” right before the ischemic changes took place. He was non-compliant and disregarded pre-operative instructions from abstinence from any forms of nicotine.

Discussion

Smokeless tobacco is used throughout the world in various forms. Some forms may be more addictive than cigarette smoking itself. The nicotine content of “Maras powder”, which is made from *Nicotiana Rustica* L is 6–10 times higher than *Nicotiana tobacum* L which is tobacco that is found in cigarettes [1, 2]. *Nicotiana Rustica* leaves have a nicotine content as high as 9 %, whereas *Nicotiana tabacum* leaves contain only about 1 to 3 %. In Russia, *N. rustica* is called “makhorka” and was smoked by the lower class before normal tobacco became widely available (after WWII) and is still sometimes smoked by peasants and farmers. It also has higher nicotine content compared with the Swedish smokeless tobacco “snus” [3]. The urinary cotinine levels, which is an indicator of biomarker of tobacco consumption and intake of nicotine, was found to be 3 times higher in “Maras powder” users compared with smokers and 32 times higher compared to passive smokers [4]. “Maras powder” has several local as well as systemic effects similar to that induced by cigarette

smoking. It induces micronucleation of the cells of the buccal mucosa, which is an indication of mutagenesis and carcinogenesis [5]. Its effects on the cardiovascular system are changing of the lipid profile in favor of atherogenesis and an echocardiographic profile in favor of heart failure [6]. In addition, serum fibrinogen levels were significantly higher compared with non-users. Oxidative stress, which is detrimental for flap survival, is found to be increased in “Maras powder” users as indicated by increased lipid peroxidation and decreased levels of endogenous antioxidants (catalase, superoxide dismutase, glucose 6 phosphate dehydrogenase) [7].

Tobacco use was found not to be associated with a higher incidence of anastomotic failures [8, 9]. Intraarterial nicotine although decreased the blood flow by 78 % it did not affect the patency of rat femoral arterial anastomosis [10]. However, nicotine is a strong stimulant of sympathetic ganglia and the adrenal medulla resulting in an acute increase in circulating levels of adrenaline and noradrenaline, resulting in changes in hemodynamics of the microcirculation [11, 12]. This may explain the presence of arterial and venous signal even though the flap was ischemic in case 2. In addition, smokers experience a higher rate of delayed wound healing at the recipient site with higher rates of flap debridement and repeat skin grafting compared with non-smokers [8]. Smokeless tobacco in the form of “Maras otu” was found to be associated with significantly higher rates of flap necrosis in a rat dorsal random skin flap model when administered daily after the flaps were raised [13].

Although our patient had severe diabetes, this is not a contraindication to microsurgical reconstruction as the rate of anastomotic thrombosis and free flap viability rates are the same as in non-diabetic patients [14]. However, the normal wound healing is altered which leads increased rates of dehiscence of the free flap from the wound bed. In our patient, the flap underwent an acute change with ischemia without any loss of signals or any dehiscence from the bed, thus suggesting an acute change in microcirculation rather than a true anastomotic failure.

Although extremely rare, delirium has been described in patients in the intensive care unit due to nicotine withdrawal in heavy smokers [15]. In these patients resolution of the symptoms within hours are seen after administration of transdermal nicotine patch. However, in our patient with delirium this method of treatment could not be applied due to possible adverse effects of nicotine on the flap. For patients who are addicts for a long time supplementation with anxiolytic or benzodiazepines may be warranted in the postoperative period since nicotine replacement can not be done. Our patient was a relatively young healthy male with no psychiatric, medical or drug history. He was out of the ICU and on a regular floor, and 2.5 days out from his microsurgical reconstruction and communicating normally when the acute psychosis took place. Thus, his delirium can not be explained just by a limited ICU stay or the psychological trauma of the event or the operation. In these cases an underlying substance withdrawal should be sought.

A detailed history from the patient regarding substance abuse is very critical prior to free flap surgery as many patients do not even regard “Maras powder” as a substance. In addition, close monitoring of the patient during the hospital stay against covert use should be done if there is a history.

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