



Liposuction fat emboli resulting in myocardial infarction: a case report and review of the literature

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Received: 18 December 2018 / Accepted: 11 February 2019 / Published online: 23 April 2019
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Abstract

Liposuction is a well-tolerated and safe procedure performed by plastic surgeons. Rare, major complications include infection, perforation of abdominal wall/viscus, and fat emboli. Fat emboli, seen more often after long bone fractures, are rarely associated with liposuction. We report the only known case of myocardial infarction (MI) secondary to fat embolism in the setting of post-procedural liposuction. A review of the literature was undertaken to elucidate the pathophysiology of liposuction-associated fat embolism, identify patient and procedural risk factors, discuss diagnostic criterion, and identify management of this rare but potentially fatal complication.

Level of Evidence: V

Type of study: Risk study

Keywords Suction assisted lipectomy · Liposuction · Fat emboli · Fat emboli syndrome · Myocardial infarction

Introduction

Suction-assisted lipectomy is a safe and frequently performed plastic surgery procedure. Minor complications such as contour irregularities, edema, and superficial infections occur in up to 10% of cases [1]. The risk of mortality associated with liposuction is 1/5000 [1, 2]. Serious complications include infection, abdominal wall/viscus perforation, pulmonary thromboembolism, and fat embolism [2]. Largely subclinical, fat embolism is reported to occur in 8.5% of patients undergoing liposuction and may or may not be associated with fat embolism syndrome (FES), a systemic multiorgan system inflammatory response to high concentrations of circulating free fatty acids [3]. Large circulating fat emboli may become lodged in the pulmonary vasculature with clinical manifestations similar to pulmonary thromboembolism. Symptoms include pulmonary compromise, right

heart strain, and in severe cases, sudden death. Arterial fat embolism is uncommon as macroscopic fat particles are unable to pass through the pulmonary circulation. We report the only known case of myocardial infarction secondary to fat embolism after liposuction and review the literature.

Case report

A 38-year-old African American female with a body mass index of 30 underwent liposuction of her abdomen, flanks, and back under local anesthesia at an outpatient center. Relevant past medical history included an unprovoked deep vein thrombosis while on oral contraceptive pills 10 years prior. The procedure went as planned and she was discharged post-operatively with subcutaneous enoxaparin. Hours after her procedure, she developed sharp substernal chest pain and presented to the emergency department. Initial echocardiogram (EKG) and chest x-ray were negative. Troponin level was elevated, and a repeat EKG showed ST segment elevations in leads V4–V6 (Fig. 1). The patient was taken emergently for cardiac catheterization. Diffuse filling defects involving the left anterior descending, circumflex, and obtuse marginal branches were found which was suggestive of an embolic phenomenon (Fig. 2). Revascularization failed with angioplasty. A Pronto (*Canadian Hospital Specialties Ltd. Oakville, Ontario, Canada*) cardiac extraction catheter was used

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Room: Loc:10

Vent. rate	95	BPM	*** Age and gender specific ECG analysis ***
PR interval	148	ms	Normal sinus rhythm
QRS duration	72	ms	Anterior infarct (cited on or before 27-OCT-2017)
QT/QTc	372/467	ms	Lateral injury pattern
P-R-T axes	71 76	°	*** ACUTE MI / STEMI ***
			Abnormal ECG
			When compared with ECG of 27-OCT-2017 18:15,
			No significant change was found

Technician: DWYER
Test ind:CP

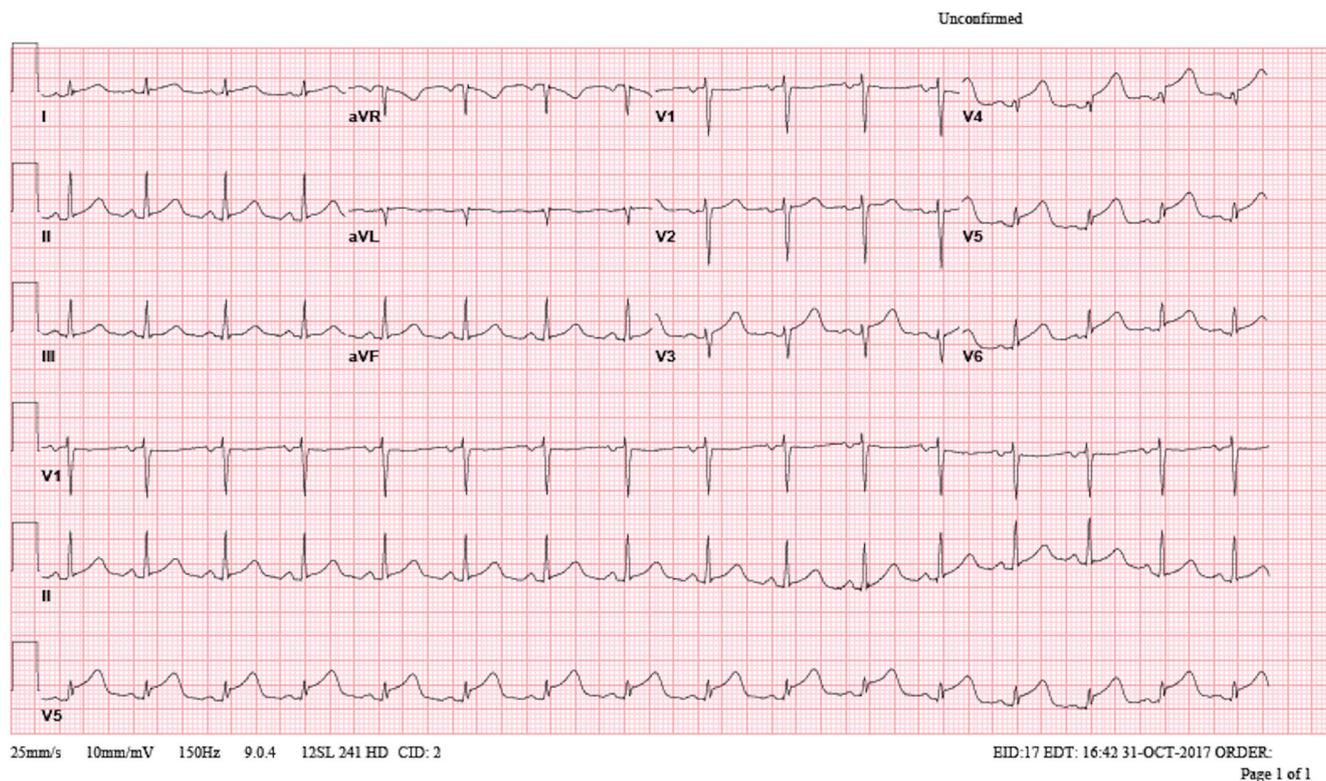


Fig. 1 EKG showing ST elevation indicative of a myocardial infarction

to remove emboli with some restoration in flow (Fig. 3). Interventional cardiology reported suction output from the Pronto device to have a lipid component rather than standard thrombus. The patient was intubated; an Impella (*Ambimed. Danvers Massachusetts, USA*) device was placed and presses started. During the procedure, she was given antiplatelet medications (abciximab and clopidogrel), adenosine, heparin, nitroglycerin, and tissue plasminogen activator.

The patient was transferred to a cardiac intensive care center, intravenous steroids were started, and a transthoracic echocardiogram showed an initial ejection fraction of 25–29%. A urine fat analysis was attempted but was not analyzed by the laboratory. The patient improved with inotropic support. The Impella was removed 2 days later. She remained hemodynamically stable and was ultimately discharged home.

Discussion

Current literature has highlighted the threat of fat embolism following gluteal autoaugmentation. Macro and or

microscopic fat particles liberated from adipocytes during liposuction enter systemic circulation. Subclinical fat embolism of macroscopic fat globules likely occurs during liposuction regardless of technique [4, 5]. Techniques increasing the likelihood of symptomatic fat emboli include combination procedures, concurrent fat injection, and liposuction without tumescence [6–10]. Fat emboli syndrome (FES) is the systemic response to high concentrations of circulating free fatty acids leading to endothelial injury and multiorgan system dysfunction via the release of inflammatory mediators, acute phase reactants, and platelet aggregation. Symptoms include alveolar hemorrhage, chemical pneumonitis, and increased capillary permeability [7, 11, 12].

Fat emboli and FES can be life threatening and are managed differently than other diagnosis presenting with similar clinical manifestations. FES presents as a multisystem disorder, typically within 1 to 2 days following liposuction [13]. Symptoms are nonspecific, including respiratory dysfunction, ranging from tachypnea to respiratory distress. Neurologic effects include altered mental status progressing to seizures and coma. Skin manifestations of a petechial rash occur

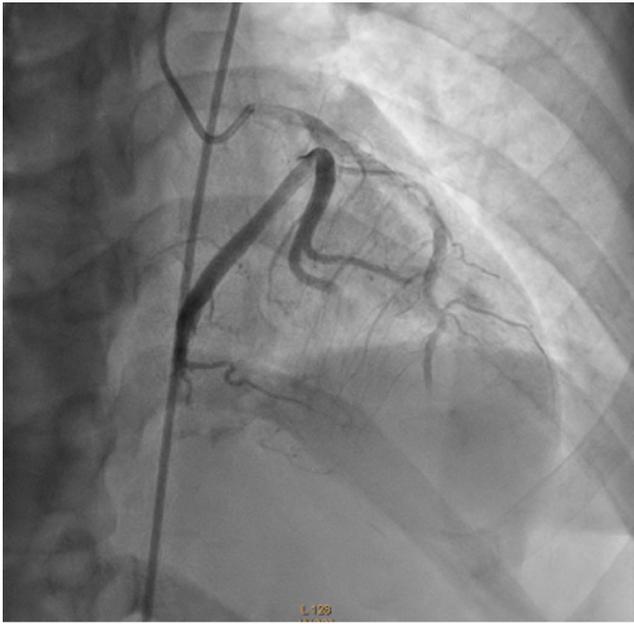


Fig. 2 Cardiac catheterization showing diffuse blockage of the coronary arteries

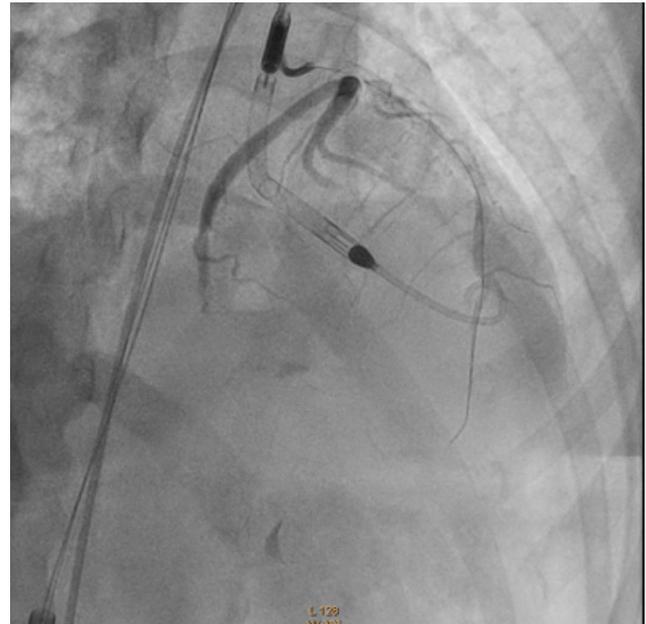


Fig. 3 Cardiac catheterization showing retrieval device and reestablished flow to distal coronary arteries

variably in 25–95% of cases and may be the only distinguishing pathological finding [11, 13]. Characteristics on computerized tomography (CT) of the chest found in FES include ground-glass lesions and centrilobular nodules within the lung parenchyma. These findings correlate with clinical severity [14]. Presentation of fat embolism is similar to pulmonary thromboembolism; however, anticoagulation and clot breaking therapies are ineffective. Transthoracic echocardiogram can be used for direct visualization of snow storming emboli traveling through the inferior vena cava into the right atrium [15]. CT-dedicated pulmonary embolism studies are sensitive but not specific to pulmonary fat emboli. When performing liposuction or fat grafting procedures, a high index of suspicion should be maintained. Hydration and hemodynamic support are standard of care for treatment of fat emboli and FES [16].

Our patient presented with a myocardial infarction and cardiac catheterization demonstrating diffuse coronary artery filling defects indicating an embolic origin of occlusion. Intraprocedural coronary artery aspirate appeared to be lipid. In order for fat to embolize to the coronary arteries, a cardiac shunt would need to be present. Unfortunately, this was not identified as placement of the balloon pump obscured visualization on echocardiogram. A pulmonary shunt could have been present; however, it is less likely as the degree of coronary occlusion indicates an embolus of larger size. A thromboembolism passing through the presumed cardiac shunt may be possible. A DVT in this patient is less likely due to a lack of general anesthesia, presentation within 24 h post-procedure as well as no history of leg swelling or other symptoms

indicative of a deep vein thrombosis. Post-operative coronary artery spasm and plaque rupture are possible. Typical presentation is during emergence from anesthesia and usually involves a single coronary artery [17].

Only one case of fat emboli crossing into the arterial circulation via a presumed patent foramen ovale (PFO) has been reported in the literature. In this case, the emboli lodged in the cerebral vasculature resulting in a massive stroke and eventual brain death of the patient [18].

Conclusion

Fat emboli and FES are recognized phenomena following liposuction. The majority of cases are subclinical. Recognition of the clinical signs of FES and fat embolism can be life saving. Fat emboli may enter the arterial circulation through cardiac shunts such as a PFO. We present the only case in the literature of a fat embolism resulting in a myocardial infarction.

Compliance with ethical standards

Conflicts of interest Dr. Grome, Dr. Bartlett, and Dr. Izaddoost declare that they have no conflict of interest.

Patient consent All patient information has been de-identified and informed consent was obtained from all individual participants included in the study.

Funding There was no funding provided for this study.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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