

Beauty and the Beast, Fatal Ischemic Stroke as a Complication of Cosmetic Facial Autologous Fat Injection: A Case Report

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Case Report

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ABSTRACT

Here we report a 54-year-old female patient who developed left-sided weakness after autologous fat injection to the face and underwent emergent mechanical thrombectomy upon detection of right internal carotid artery occlusion. To the best of our knowledge, this is the first case in the literature that thrombectomy material taken from multiple large cerebral vessels is histopathologically compatible with cerebral fat embolism.

Cerebral fat embolism should be considered in stroke patients who recently had a cosmetic facial injection. Further studies are necessary to determine the standard of care for this severe complication.

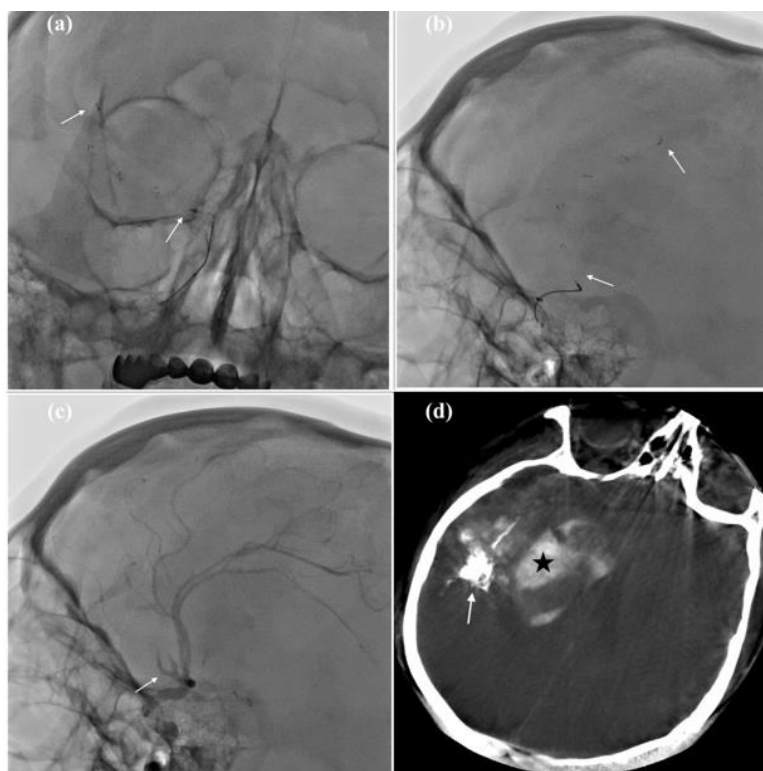
INTRODUCTION

Stroke is one of the leading causes of morbidity and mortality in adults. The majority of strokes are caused by large artery atherosclerosis, cardio embolism, and small vessel occlusions [1]. Particularly in the young age group; emboli, vasculopathy, arterial dissection, and intra cerebral hemorrhage are common reasons. Cerebral Fat Embolism (CFE) is a very rare cause of Acute Ischemic Stroke (AIS) and mostly reported concomitant with Fat Embolism Syndrome (FES) [2]. Surprisingly CFE may also present without underlying FES; as a beastly complication of beauty intended facial fat injections [3-5]. This complication has a very poor clinical outcome. Currently, there is a lack of effective treatment [6]. Although some patients have been successfully treated with mechanical thrombectomy (MT) [5,7] Its role and indications in the management of this unique subtype of AIS are still uncertain. We believe that the case we present is very demonstrative for CFE and it will emphasize the importance of patient selection for MT.

CASE PRESENTATION

A 54-year-old female patient underwent abdominoplasty and subsequent fat injection into face under general anesthesia in an external center. She was previously healthy and had no medical history except cured breast cancer 5 years ago. One hour after surgery she developed speech impairment and left-sided weakness. She has been transferred to our stroke center two hours from symptoms onset. During her examination in the emergency room, she was alert and had dysarthric speech. Her vital signs and oxygen saturation were in normal ranges. Both pupils showed normal indirect and direct light reflexes. Muscle strength of the upper and lower extremities on the right and left sides were 5/5 and 2/5 respectively. Her total national institutes of health stroke scale score was 10. Considering anamnesis and neurological exam findings; imaging studies were done quickly to evaluate stroke. Head computed tomography (CT) images revealed minimal edema and subtle loss of gray-white matter differentiation in the right temporoparietal regions. Additionally, there were fat-compatible hypodensities within the Middle Cerebral (MC) and Anterior Cerebral (AC) arteries (Figure 1).

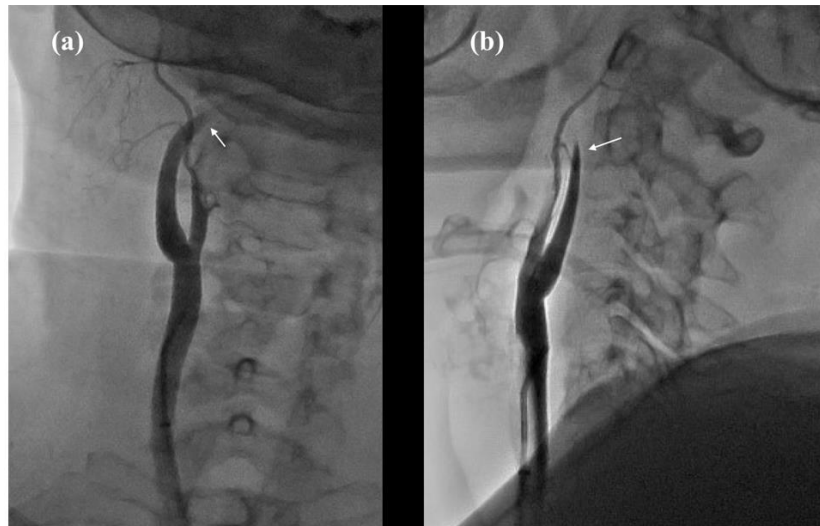
Figure 1. Pre-procedural CT and CTA images of the head.



METHODOLOGY

Computed Tomography Angiography (CTA) images displayed proximal occlusion of right internal carotid (ICA) and External Carotid (ECA) arteries. Due to the lack of alternative treatment, the patient transferred to the angiography unit for urgent Mt. After local anesthesia, the right common femoral artery was punctured and an 8Fr vascular sheath was placed. 90 cm 6Fr Neuronmax long sheath was introduced and located in the right common carotid artery (CCA). Gentle contrast injection was showed proximal occlusion of right ICA and ECA (Figure 2).

Figure 2. Digital subtraction angiography (not subtracted) images of the neck.



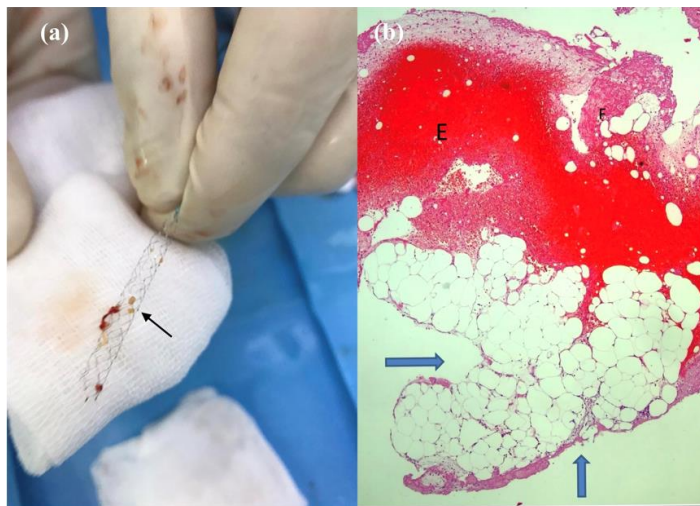
Through the long sheath, 6Fr Sofia distal aspiration catheter with a combination of 00.14 guide-wire and Rebar 18 micro catheter was advanced to the top of ICA under the continuous aspiration. Control images showed recanalization of ICA. Occlusion of the MCA was bypassed with a micro catheter and 4 × 40 mm Solitaire stent retriever (SR) were deployed. After waiting for the appropriate time, SR retracted under the continuous aspiration of the Sofia catheter. Despite several attempts, recanalization was achieved only in the M1 segment of MCA. MT was also performed from ACA territory (Figure 3).

Figure 3. Digital subtraction angiography (non-subtracted) and post-procedural CT images of the head.



Full recanalization was achieved at ACA after the first pass. Thrombectomy material macroscopically was compatible with fatty tissue. Also, it was later confirmed by histopathological evaluation. There was no active contrast extravasation in the final images taken from the proximal right Ica. Control brain tomography just after the procedure showed gyral and parenchymal contrast staining and contrast extravasation in the right MCA territory. There was a lack of any mass effect to surrounding brain tissue by the leaked blood yet (Figure 4).

Figure 4. Arrow shows macroscopic fat tissue on the retrieved stent from the right middle cerebral artery.



The patient was transferred to the hospital where she underwent plastic surgery upon the request of her relatives. Neurosurgery consultation was recommended to evaluate the necessity of early decompressed craniotomy. The patient died few days after the procedure. Follow-up details and autopsy results were not available to us.

DISCUSSION

FES is a seldom disease that mostly occurs following an orthopedic trauma, classically manifested by the triad of respiratory insufficiency, cerebral involvement, and petechial skin rash. Cerebral involvement, which is also termed CFE, is the main cause of morbidity and mortality of FES. Ischemic and hemorrhagic strokes, seizures, autonomic disorder, acute encephalopathy, and coma are the major complications of CFE [8].

Embolized fat globules are the main reason for neurological complications of CFE. Large-sized fat globules may cause early-onset acute ischemic stroke symptoms by causing large vessel occlusions. Likewise, smaller-sized fat globules might occlude the distal small vessels and cause late-onset neurological symptoms. In addition, fatty acids may induce endothelial damage by chemical reactions. Endothelial damage may lead to bleeding and neurological symptoms by occluding vessels due to vasoactive substances and platelet aggregation [9]. Cosmetic facial injections are being applied frequently nowadays. Although exceedingly rare, acute ischemic stroke cases have been reported after these procedures. The underlying pathogenesis is not clear. Some authors have stated that in the course of injection, unintentionally needle punctures of a small artery and continuous pressure applied during fat injection, might causes fat globules to embolize retrogradely to ECA. Furthermore, this continuous pressure may activate the

ICA-ECA anastomoses and result in fat embolism to ICA and its branches [3-10]. Moreover, fat globules may even reach retrogradely to CCA through ECA and from there antegradely embolize to ICA.

There is a lack of widely accepted treatment of CFE and it has been reported as self-limiting in some reports. Yet, the symptoms in the presence of massive CFE that caused large vessel occlusion are progressive rather than self-limiting. Thus, to prevent ischemic infarction recanalization of the occluded artery is compulsory [11]. To reestablish arterial flow, thrombolytics are a well-known choice of treatment [12]. However, it is unlikely to achieve recanalization with thrombolytics, if the source of arterial occlusions is based on embolized fat globules. Therefore, MT which has been shown effective in both proximal large and distal small cerebral arterial occlusions may be an option as salvage therapy for these patients [13,14]. Some MCA M1 segment occlusions due to CFE have been successfully treated with MT. CFE may also cause multiple large vessel occlusions and full recanalization of such cases is not reported yet. Similarly, in a retrospective study, authors have evaluated 6 cases that developed large vessel occlusion after facial fat injection. Although they applied MT to 5 of the patients the symptoms proceeded further. Only 3 of the patients, who underwent early decompressive craniectomy, survived. Therefore, the authors consider early decompressive craniectomy essential for an increase of survival rates despite inevitable neurological deficits [15].

Another point to emphasize is endothelial damage, induced by chemical reactions of fatty acids could be greater in the presence of massive CFE. Thus, these patients may be more prone to bleeding. For our case, we had to attempt MT 3 times, to achieve full recanalization of MCA. Bleeding that occurred after the procedure might be the result of multiple MT attempts and endothelial damage. Therefore, we believe that multiple MT attempts should be avoided in the treatment of massive CFE. In addition, long segment occlusions extending distally also block collateral flow and may cause ischemic infarction in a shorter time than expected. For that reason, early decompressive craniectomy should be considered in this group of patients.

CONCLUSION

Although fat injection to the face is considered a safe procedure, it can lead to catastrophic complications such as stroke. Both plastic surgeons and neurologists should be aware of this complication. To prevent this complication, excluding vascular penetration during injection is crucial by performing injections very gently. CT and CTA can allow a fast and accurate diagnosis. For the treatment, there is a lack of standard hence mechanical thrombectomy might be effective in selected cases. In the presence of massive CFE, early decompressive craniectomy can be lifesaving. Further studies are necessary to determine the standard of care for this severe complication.

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