
The incorporation of new technologies such as ultrasound, J-Plasma (helium plasma) and MicroAire (power assisted liposuction) has facilitated liposculpture procedures, resulting in greater patient satisfaction. The benefits of these technologies are accompanied by low reported complications; this case is the fourth description of pneumomediastinum secondary to the use of Renuvion® (J-Plasma) after liposuction for fat removal in the arms and thighs. This rare complication should be considered as part of the differential diagnosis during the study of clinical dyspnea and subcutaneous emphysema in the postoperative period.

Key words
Lipectomy; Mediastinal emphysema; Dyspnea; Renuvion®/J-Plasma; Case report; Anesthesia; Anesthesiology.
INTRODUCTION

The incorporation of new technologies such as ultrasound using J-Plasma (helium plasma) and MicroAire (power assisted liposuction) has facilitated liposculpture procedures, resulting in greater patient satisfaction and benefits (1,2); moreover, these technologies are associated with low complications, as described so far. This case is the fourth description of pneumomediastinum associated with the use of the Renuvion® (J-Plasma) technology, following liposuction for fat removal from the arms and thighs (3-5).

CASE REPORT

A 52-year-old female patient with no prior history of disease who underwent conventional liposuction of arms and lateral aspect of the thighs after tumescent solution infiltration (a mix of crystalloid plus 2 cm³ of epinephrine [2:1,000]). After removing approximately 7,000 cm³ of fat, skin tightening was performed using the Renuvion J-Plasma® technology. For the procedure, the generator was set at 80% power and helium flow at 2 liters per minute (L/min); the intervened body areas were treated on average with 6 repetitions each. In the immediate postoperative period the patient recovered well and was discharged from the hospital on the same day.

Four days after the surgical procedure, the patient presented to the emergency service complaining of one day of symptoms consisting of dyspnea, adynamia, headache, chills and generalized pain. Vital signs at presentation showed increased heart rate and temperature (blood pressure: 124/61 mm Hg; heart rate: 97 bpm; respiratory rate: 22 bpm; temperature: 37.9 °C). Findings on physical examination included painful facies, pale mucosas, and dressings on the intervened extremities showing signs of serosanguinous drainage but no signs of perilesional infection; crepitations were palpated over the sternal, supra and infracavicular region, suggesting subcutaneous emphysema; the abdomen was soft and depressible on palpation, with no signs of peritoneal irritation. Paraclinical tests on admission showed severe anemia (hemoglobin 6.0 g/dL) (Table 1), associated with low cardiac output signs due to slow capillary filling, prompting transfusion of two units of red blood cells and the administration of procoagulants (tranexamic acid), oxygen supplementation through nasal cannula with 32% FiO2% (approximately) and central venous catheter placement. Due to signs of hypoperfusion in the first few hours, pulmonary artery CT angiography was performed, ruling out pulmonary embolism, but showing pneumomediastinum distributed along the neck and chest, and confirming generalized subcutaneous emphysema (Figure 1).

The patient was assessed by the Thoracic Surgery and Plastic Surgery services which indicated clinical observation and monitoring in the intensive care unit, with no need for additional surgical interventions.

Because of increased temperature on admission, empirical antibiotic coverage was initiated with intravenous (IV) administration of piperacillin tazobactam 4.5 g every 6 hours + vancomycin 1 g IV every 12 hours. Initial blood cultures came back negative four days later, leading to discontinuation of antimicrobial therapy after 96 hours.

Intensive care monitoring was carried out during 48 hours, allowing to confirm dyspnea resolution and hemodynamic stability during the observation period. The follow-up chest X-ray showed subcutaneous emphysema along the chest...
wall and neck, with no significant changes on follow-up (Figure 2). Given a satisfactory clinical course, the patient was discharged after five days of observation.

**DISCUSSION**

Plasma-based devices have been used since the 1990s with the aim of heating and tightening collagen in the subdermal space in order to improve skin laxity (5). The J-Plasma/Renuvion® uses helium to allow for easy ionization under low power, creating a steady and accurate output to achieve subdermal coagulation and effective soft tissue shrinkage. The tissue around the treatment area remains at a lower temperature, allowing for rapid cooling and immediate soft tissue shrinkage without unnecessarily heating the entire dermal thickness (6).

The use of technologies such as the J-Plasma/Renuvion® is relatively recent. The United States Food and Drug Administration (FDA) analyzed the technology and, on July 15, 2022, approved (K191542) a helium-based plasma device (Renuvion®; Apyx Medical Corporation, Clearwater, FL) for soft tissue cutting, coagulation and ablation, and authorization 510(k) was granted for the use of Renuvion® in subcutaneous dermatological and esthetic procedures to improve the appearance of loose skin in the neck and submental region. In 2023, the FDA approved Renuvion®/J-Plasma for procedures designed to improve skin appearance by means of dermal rejuvenation or skin tightening (7). Given the recent approval by the FDA, the use of this therapy in the clinical setting may still be infrequent and hence the paucity of reported adverse events, with subcutaneous emphysema (8) and pneumomediastinum being among the most noteworthy. These complications have been found after the use of J-Plasma, and described as subcutaneous emphysema, usually involving the neck, chest and, in some cases, the abdomen, with no fatal outcomes reported (3-5). This case is the fourth description in the literature of

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**Table 1. Main laboratory tests on admission to the ICU and after 24 hours.**

<table>
<thead>
<tr>
<th>Test</th>
<th>On admission</th>
<th>24-hour follow-up in ICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb (g/dL)</td>
<td>7.5</td>
<td>7.2</td>
</tr>
<tr>
<td>Plaquetas</td>
<td>246,000</td>
<td>210,000</td>
</tr>
<tr>
<td>PO2 (mm Hg)</td>
<td>100.4</td>
<td>NR</td>
</tr>
<tr>
<td>PCO2 (mm Hg)</td>
<td>36.7</td>
<td>NR</td>
</tr>
<tr>
<td>Lactate (mmol/L)</td>
<td>5.5</td>
<td>1.39</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>0.69</td>
<td>0.63</td>
</tr>
</tbody>
</table>

NR: no record.

**Source:** Authors.

**Figure 2.** Chest X-Ray. Subcutaneous emphysema distribution in the neck and chest (white arrows).
pneumomediastinum associated with
the use of J-Plasma technologies after
a cosmetic procedure (3-5). In this case,
J-Plasma/Renuvion® was used in accordance
with the standards suggested by the device
guideline, applying 80% power and 2 L/
min flow, with 6 repetitions in each area
(the helium-based radio frequency device
guideline is based on the number of
times the surgeon uses de handpiece to
deliver energy to the treatment area. The
recommended technique is to treat 1-1.5
cm of tissue per second, with retrograde
activation in device settings of 60-80%
power and helium flow within a range of
1.5-3 liters per minute) (7).

The subcutaneous emphysema and
pneumomediastinum documented in this
case are not easily explained in the light
of the classic mechanisms that give rise to
these complications — infection, visceral
perforation or spontaneous alveolar
rupture (4). Therefore, in this case, the
etiology could be attributed to an excess
of helium, the mechanism by which the
device operates (3-4), possible together
with a low conversion from gas to plasma in
the generator.

As for the clinical presentation, similar
to other reported cases, subcutaneous
emphysema in the neck and anterior
chest wall was described (3-5). Dyspnea,
on the other hand, has been described as
a frequent symptom associated with
pericardial and/or mediastinal gas
extension (5). However, the diagnosis was
established while looking for potential
pulmonary embolism — a more frequent
diagnosis (9) — in a patient with risk
factors and a consistent clinical picture in
whom pulmonary CT angiography revealed
pneumomediastinum as an incidental
finding that explained the presence of
dyspnea. The other symptoms such as
asthenia, adynamia and headache could be
explained by the drop in hemoglobin
(Hb), believed to be the result of blood
loss during the intra and postoperative
periods. The rise in temperature
prompted blood cultures and clinical
exam, which ruled out a suspected
infection.

Treatment of subcutaneous emphysema
is usually conservative, focused on early
identification and removal of the gas source,
after ruling out a pneumothorax. Clinical
observation is often required with the patient
breathing ambient air or receiving an FiO2
close to 100% in order to accelerate gas
diffusion. The use of hyperbaric oxygen has
been reported in one case, with similar good
outcomes and fast recovery (5). In this case,
the patient was managed conservatively
with oxygen therapy through nasal cannula
and 32% FiO2 (approximately) with a good
response and early discharge 96 hours after
admission.

CONCLUSION
This case describes an infrequent
complication associated with the use of
J-Plasma/Renuvion, which must be
considered as part of the differential
diagnosis during the work-up for postoperative clinical dyspnea and
subcutaneous emphysema.

ETHICAL RESPONSIBILITIES
Protection of human and
animal subjects
The authors declare that the procedures
followed were in accordance with the
regulations of the relevant human research
ethics committee, and in accordance with
the World Medical Association and the
Declaration of Helsinki.

Data confidentiality
The authors declare that they have followed
the protocols of their work center on the
publication of patient data.

Right to privacy and informed consent
The authors obtained informed consent
from the patients and/or subjects referred
to in this article. These documents are kept
by the corresponding author.

Conflict of interest
The authors have no disclosures to make.

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