



Visceral perforation in liposuction. Evidence based medicine

Perforación visceral en liposucción. Medicina basada en evidencia

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Keywords:

Abdominal liposuction, liposuction, lipoaspiration, postoperative complications, intestinal perforation, small bowel perforation, bowel perforation, colonic perforation, visceral perforation, peritonitis, necrotizing fasciitis.

Palabras clave:

Liposucción abdominal, liposucción, lipoaspiración, complicaciones postoperatorias, perforación intestinal, perforación del intestino delgado, perforación de intestino, perforación de colon, perforación de vísceras, peritonitis, fasciitis necrosante.

ABSTRACT

Visceral perforations are a severe complication of liposuction; the incidence and risk factors are not precisely known. We carried out a systematic review in order to find the risk factors and issue safety recommendations. We found few publications on the subject and with IV and V level of evidence. Visceral perforations are the second cause of death from lipoaspiration. The factors attributed to this complication are the surgeon's lack of experience and factors related to patients, such as obesity, globose abdomen, presence of hernias, scars and adhesions. The perforations are of two types: the first group, of extreme urgency, manifest during surgery or in the first postoperative hours. This group includes tension pneumothorax and hemorrhage due to injury to organs or large vessels. These conditions require immediate treatment to avoid the death of the patient. The second group is bowel injuries. They occur in an insidious way, several days after surgery, the cardinal manifestation being atypical pain, which may be accompanied by intestinal obstruction, fever and general deterioration. Delaying the treatment leads to poor evolution and high mortality. The exploratory laparotomy is a lifesaving diagnostic procedure that must be performed urgently, even if radiographic studies are not available. In most cases the main problem is not the incident of the injury, but the failure to recognize it.

RESUMEN

Las perforaciones viscerales son una severa complicación de la liposucción, no se conoce con exactitud su incidencia y factores de riesgo. Realizamos una revisión sistemática con la finalidad de encontrar los factores de riesgo y emitir recomendaciones de seguridad. Las publicaciones que encontramos del tema son escasas y con nivel de evidencia IV y V. Las perforaciones viscerales son la segunda causa de muerte por lipoaspiración. Los factores atribuidos a esta complicación son la falta de experiencia del cirujano y otros relacionados con los pacientes, como la obesidad, abdomen globoso, presencia de hernias, cicatrices y adherencias. Las perforaciones son de dos tipos: 1) De extrema urgencia. Se manifiestan durante la cirugía o en las primeras horas de postoperatorio, en este grupo se incluye el neumotórax a tensión y la hemorragia por lesión de órganos o grandes vasos; estas afecciones requieren de un tratamiento inmediato para evitar la muerte del paciente. 2) Lesiones de los intestinos. Se presentan en una forma insidiosa varios días después de la cirugía, la manifestación cardinal es el dolor atípico que se puede acompañar de obstrucción intestinal, fiebre y deterioro general; el retraso en el tratamiento conlleva una mala evolución y alta mortalidad. La laparotomía exploradora es un procedimiento diagnóstico de salvamento que se debe realizar en urgencia extrema, aun cuando no se cuente con los estudios radiográficos. En la mayoría de los casos el problema mayor no es el incidente de la lesión, sino la falla en reconocerla.

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INTRODUCTION

In 2017, ISAPS registered 1,573,680 liposuction surgeries worldwide; 73,231 liposuctions were performed in Mexico.¹ There are several causes of death attributed to liposuction. Visceral perforation is one of the most frequent causes with an incidence of

7.81% to 15%.²⁻⁴ fourteen cases of perforation have been reported per 100,000 liposuctions. Several authors have mentioned that there is underreporting of this complication, so we do not know its true incidence.⁵⁻⁷

Visceral perforations during liposuction are attributed to two factors: the surgical technique mainly due to the experience of



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the surgeon and the structural conditions of the patient. Some risk factors related to the patient are obesity, globose abdomen, presence of umbilical hernias, eventrations, abdominal scars and fibrotic adhesions caused by previous liposuctions.⁴⁻⁷

The most frequent affected structure is the small intestine in the ileum portion, followed by the large intestine, liver, spleen, vena cava, deep circumflex artery, pleura and ureters. The combined perforations are present in 10%, colon and ileum 7.5%, liver and pleura 2.5%. In cases of perforation of the intestines, the cardinal finding was persistent, atypical abdominal pain and intestinal obstruction. Most perforations are not detected during surgery. Delaying the treatment is related to mortality (*see infographic*).⁴⁻¹¹

The objectives of this work are to alert surgeons of the latent risk that exists in liposuction procedures, causing visceral perforation and issue recommendations based on the best available medical evidence to prevent, detect and treat this complication.

METHODOLOGY

We conduct a systematic review in Spanish and English at the following information sites: *PubMed*, *Embase*, *Cochrane*, *Medline*, *Fisterra*, *Medigraphic*, and *Google Scholar*. The key words in Spanish that we used were: abdominal liposuction or liposuction or lipoaspiration, suction lipoplasty or suction lipectomy, body sculpture, body contouring and postoperative complications or intestinal perforation or perforation of the small intestine or perforation of the intestine or perforation of colon or perforation of viscera or peritonitis or necrotizing fasciitis. The English words were: abdominal liposuction or liposuction or suction lipoplasty or suction lipectomy or body sculpture or liposculpture or body contouring and postoperative complications or intestinal perforation, or small intestine perforation, or bowel perforation, or colonic perforation, or visceral perforation, or peritonitis or necrotizing fasciitis. With the data obtained, we prepared an infographic as a quick, simple guide, but with enough information to allow the surgeon to make a decision in an extreme case of perforation.

Shock due to hemorrhage; drilling of spleen, liver or large blood vessels

Hemorrhagic shock can be caused by local bleeding in the subcutaneous tissue produced by traumatic aspiration or in patients predisposed to bleeding as a result of blood dyscrasia, due to impaired platelet function caused by the intake of aspirin, vitamin E, red wines and some supplements, such as garlic. The other causes are produced by the loss of blood in perforations of the liver, spleen or large vessels. In the most severe cases, manifestations of shock occur during surgery or in the immediate postoperative period. Some visceral lacerations may cause minor blood loss and the shock may occur several hours after surgery.^{4-7,9}

The lesion of the cava is more frequent than the aorta. It may not be associated with intestinal perforations. Aspiration with the patient in lateral recumbency, the cannula can penetrate the retroperitoneum without affecting the intestines. CT or MRI with contrast or angiography can identify the leakage and injured vessel. In medium-thick vessels, such as circumflexes, some authors have used the embolization method to control bleeding.^{4-7,9-11}

The perforation of the liver or spleen occurs when the cannula collides with the costal edge and deflects the path to the abdominal cavity.

The factors involved are patients with prominent ribs and a significant sagging abdominal wall and insertion of the cannulas for aspiration in an oblique plane to the axis of the skin. Another factor is the type of cannulas, the thinner they are, the greater the flexion factor, which can change the direction of the tip.^{4-7,10,11}

Recommendations^{4-7,8,10-14}

1. In a patient with a globose abdomen, abdominal wall with marked sagging and prominent ribs, special care should be taken when performing aspiration in the upper quadrants of the abdomen.
2. Be constantly aware of the location of the tip of the cannula.

3. Have constant control of the direction of the cannula. Perceive where the tip is located, with the surgeon's non-dominant hand.
4. If resistance is found when inserting the cannula, change the plane and the direction of the cannula.
5. Perform the aspiration in a plane parallel to the skin axis.
6. In case of hypotension, an injury to these organs should be ruled out.
7. It is possible to maintain a hemodynamic balance, perform CT or magnetic resonance with a contrast medium to identify the site of the leakage. An alternative treatment is the embolization of the vessels that are bleeding.
8. In severe cases; in addition to resuscitation maneuvers, an exploratory laparotomy and direct control of bleeding should be performed. Request the support of an experienced surgeon.

Tension pneumothorax, pulmonary pleural perforation

Pleura perforation is one of the least frequent lesions. It may be associated with liver, spleen and bowel lesions with similar risk factors. It is a severe alteration. If it is not diagnosed and treated in a timely manner, it can cause the patient's death. The perforation produces a unidirectional valve effect on the pleura and develops a tension pneumothorax. The injury occurs when the upper quadrants of the abdomen or the inframammary area are aspirated. The clinical manifestations are dyspnea, oxygen desaturation and tachycardia; absence of respiratory noises, increased resistance to ventilate the patient, lateralization of the trachea to the opposite side of the pleural lesion, jugular engorgement and sudden hypotension. Confirmation of the diagnosis is made with a simple chest X-ray which can be done in the operating room during surgery or in the recovery area. If there is no possibility of X-rays, the diagnosis of tension pneumothorax has to be diagnosed clinically and must be resolved immediately. The initial management is with a puncture in the second intercostal space at the level of the middle clavicular line; the definitive treatment will be the placement of a chest tube connected to water sealed equipment.⁴⁻⁷

Recommendations^{4-7,12-14}

1. Remember that patients with prominent ribs, globose abdomen and sagging abdominal wall are at risk of liver, spleen and pleura perforation.
2. Be extremely careful when performing liposuction in the upper quadrants of the abdomen and in the coastal area.
3. Avoid perpendicular or oblique introduction of the cannula into the cutaneous plane.
4. If there is resistance, change the direction and the plane of the cannula.
5. In any patient who has oxygen desaturation and difficulty in ventilation, during surgery, a pneumothorax should be ruled out.
6. When liposuction is performed in the upper quadrants of the abdomen and flanks, auscultation of the pulmonary fields is necessary before the procedure is completed. It is advisable to keep the patient under observation for a minimum of 24 hours after surgery.
7. If there is suspicion or doubt of a perforation, take a chest X-ray.
8. When the radiographic study is not immediately available, the diagnosis should be made clinically.
9. In the event that a pneumothorax is confirmed, action should be taken quickly: puncture in the second intercostal space at the level of the mid axillary line.

Necrotizing fasciitis peritonitis, intestinal perforation

The viscera that are most frequently damaged by perforation during liposuction are those found in the area around the navel, as is the small intestine in its portions of the ileum and jejunum. The colon can be damaged in all parts; the most affected, is the transverse.^{4-7,15-25}

The area of greatest risk is located around the navel. Some structural features make it a very vulnerable area. Umbilical hernias and the globose abdomen with their greater prominence in the navel contribute, so that a lipoaspiration cannula is oblique to the plane of the abdominal wall and the skin. Periumbilical adhesions by cutaneous ligaments of the area and by the scar fibrotic tissue of previous

surgeries, including lipoaspirations, produce an increase in resistance to the cannula with a greater difficulty for aspiration and an increase of the bending factor of the cannula. These distortions, stiffnesses and adhesions can deflect the direction of the tip of the cannula with a greater possibility of visceral perforation around this area.^{4-7,15-25}

Different studies report that intestinal perforation is often not diagnosed in the early postsurgical period.⁴⁻⁷ Due to the characteristics of many patients who are young and with good physical reserve, not all the typical signs of intestinal perforation are always present.⁹ In lesions of the small intestine, an insidious presentation is expected. Signs and symptoms are subtle and overlap with disorders, such as postoperative ileus. The presentation of the clinical signs, in chronological order, are: persistent abdominal pain which does not yield to postoperative analgesia, abdominal distension, positive rebound, stiff abdomen and difficulty in passing gases; signs of systemic inflammation from bowel suffering, such as fever and tachycardia; tachypnea, dehydration, deterioration of its general conditions and metabolic acidosis. The cardinal finding is persistent and unusual abdominal pain, with stationary evolution of the patient in the postoperative period, with no tendency for clinical improvement.^{4-7,10,15-25}

Because the colon has a larger bacterial population, the lesion is more dangerous because of the rapid spread of the septic process to both the peritoneum and the fascia of the abdominal wall and subcutaneous tissues. Skin necrosis and major necrotizing fasciitis can be found, as well as sepsis and septic shock.^{4-7,15-25}

If the patient's evolution is unsatisfactory, he/she should be carefully reassessed and not discharged. Establish strict monitoring assessment by the gastroenterologist, general surgeon and request some exams. Hematic biometrics will be useful for determining leukocytosis with neutrophilia (data on loop suffering); C-reactive protein as a reliable inflammatory marker of acute intraperitoneal processes; chest X-ray for the detection of subdiaphragmatic free air; abdominal ultrasound for the detection of intraperitoneal

free fluid following a hemorrhage or the accumulation of fluid secondary to intestinal damage. Axial computed tomography (CAT) with contrast material is the most specific technique to detect intestinal perforation. Most authors recommend exploratory laparotomy as a salvage procedure which should be performed in cases where intestinal injury is suspected, even when radiographic studies are not available.^{4-9,15-25}

The difference between limited or extensive damage depends on the location of the lesion and the speed of diagnosis and treatment. When an early diagnosis is made, the affected intestinal loop can be repaired with direct closure without requiring a stoma. In cases where the diagnosis and treatment are made after the third d it is recommended to perform a stoma, debridement of the necrotic tissue, leave the wounds open and keep the patients in an Intensive Care Unit, to support life.^{4-9,15-25}

Recommendations^{4-7,12,14,26}

1. In all patients who are going to have a liposuction of the abdomen, risk factors should be sought: obesity, globose abdomen, sagging abdominal wall, straight diastasis, umbilical hernias, surgery scars, adhesions and irregularities, due to previous liposuctions.
2. It is advisable to request a preoperative ultrasound to determine the conditions of the abdominal wall, the thickness of the adipose panicle, the size of the abdominal viscera and the intra-abdominal fat.
3. The infiltration of the tumescent solution is performed with cannulas larger than 4 mm in diameter. Do not use thin cannulas.
4. The introduction of the cannulas should be done in a plane parallel to the axis of the skin and the abdominal wall. Avoid introduction with oblique cannulas.
5. Be specially careful when performing the aspiration around the navel. If there is resistance to scar adhesions, change the direction and plane. In the presence of umbilical hernia, centrifugal suction is preferable to the umbilical scar.¹⁵
6. All patients who undergo abdominal liposuction should remain in hospital

- observation for at least 24 hours. Office check up should be carried out at 48 hours.
7. Rule out intestinal perforation in patients with persistent abdominal and unusual pain.
 8. Patients with abdominal distension, difficulty in passing gas, stiff and painful abdomen, fever, tachycardia must be admitted for study, request laboratory tests, simple abdominal and chest plates, ultrasound and CT or MRI with contrast material.
 9. In cases of suspected intestinal injury, request assessment by a general surgeon with experience in reoperative abdominal surgery.
 10. In cases of suspected intestinal injury, request assessment by a general gastroenterologist surgeon.
 11. When there is a strong suspicion of intestinal perforation, even when CT or MRI is not available, perform an exploratory laparotomy.
 12. The diagnosis and treatment of perforations should be timely. Delay will make the treatment more complex, the hospital stay will be increased and there will be a greater risk of death.

DISCUSSION

We conducted a systematic review trying to find the best available medical evidence published. The levels of evidence of the publications found were IV and V. Most publications correspond to a case report or a series of cases. Other publications we used for this work were some revisions and ideas and innovations. There is a need for controlled clinical studies, meta-analysis, laboratory and body research to be able to issue recommendations with a greater foundation. Fourteen cases of perforation have been reported per 100,000 liposuctions. It is the second or third reported cause of deaths in lipoaspiration.²⁻⁵ Several authors have mentioned that there is underreporting of this complication, so we do not know its true incidence. Complications and deaths should be reported including those that occur within 30 days after liposuction.^{5-7,27} In the Safety Committee we keep a record of the cases we have detected and report the risk factors. The Ministry of Health in Mexico through COFEPRIS requires the registration of

adverse events. The report can be anonymous and is confidential.²⁸ It is necessary to promote reporting complications. By having a better record, we can determine risk factors and establish strategies to reduce this complication.

Several authors have considered that the main risk factor for visceral perforations due to lipoaspiration is the lack of experience of the surgeon.^{4-7,12-14,26} Although this premise is logical and plausible, we did not find enough data to confirm this assertion. In prospective studies that we will perform, we will include this factor for the purpose of study. We must promote personalized training of young surgeons to avoid preventing perforations.

Lehnhardt found that the lack of legal restrictions will increase the execution of liposuction by unqualified personnel. Many of these procedures were performed by other surgeons and by non-medical personnel. In addition, it was common for these procedures to be performed as outpatient surgery in offices. This caused an increase in the number of complications related to liposuction. One of the most severe complications was visceral perforation made by aspiration cannulas with high mortality.⁴ Liposuction is a high-risk procedure and personalized training of surgeons is required. They will not be able to carry it out until they master the capabilities that make liposuction a safe procedure.

In the cases reported, there are common structural alterations related to visceral perforations due to lipoaspiration. The most frequent being: obesity, globular abdomen, presence of umbilical hernias, eventrations, abdominal scars and fibrotic adhesions caused by previous liposuctions.^{4-7,15-25} The best strategy to avoid this complication is the preoperative detection of these alterations with a guided examination supported by an ultrasound study. Ultrasound will help identify abdominal wall defects, the size and dilation of the abdominal viscera, the thickness and density of the adipose panicle, and the presence of scar adhesions and hernias.

During a liposuction of the abdomen, hemorrhagic shock can occur due to injury of large vessels or perforation of the liver or spleen.^{4-7,9,11,12} It is a complication that has

to be resolved immediately. When there is suspicion even if a CT or MRI is not available, a surgical examination should be performed; including: the retroperitoneum, the groin and the sites where the great vessels emerge. The cava can be perforated even without bowel injury, which implies that the aspiration cannula entered the retroperitoneum without going through the abdominal cavity with a lateral approach.

Liver or spleen perforations may be unique or associated with perforations of other structures such as the colon or pleura; it occurs when the cannula collides with the rib edge and deflects the path to the cavity.^{4-7,9,11,12} In obese patients with globose and flaccid abdomen, and prominent ribs, one should be specially careful when aspirating the upper quadrants of the abdomen or flanks.

The perforation of the pleura is a severe alteration. The effect of unidirectional valve in the pleura can produce a tension pneumothorax. When the upper quadrants of the abdomen or the inframammary area are aspirated and there is sudden dyspnea, oxygen desaturation and tachycardia and increased resistance to ventilate the patient, we should suspect a pleura perforation with the formation of a pneumothorax.⁴⁻⁷ A chest X-ray will confirm the diagnosis; however, in the face of clinical suspicion one must act quickly even if X-ray is not available. A puncture should be performed in the second intercostal space. The definitive treatment will be the placement of a chest tube connected to a water sealed equipment. The delay of the treatment can be fatal for the patient.

The viscera that are most frequently damaged by perforation are those found in the area around the navel, the ileum and jejunum are affected in up to 62% of cases (Infographic).^{4-7,15-25} This area is very vulnerable, due to its structural characteristics: globose abdomen with its greater prominence in the navel; large thickness of the adipose panicle; frequent presence of umbilical hernias; periumbilical adhesions by cutaneous ligaments of the area and by the fibrotic scar tissue from previous surgeries, including lipoaspirations. These characteristics make it difficult to introduce the cannulas and increase the flexion

factor of the cannula with the possibility of inadvertently deflecting the tip and piercing the abdominal wall.

The perforations of the small intestine are of an insidious presentation. The signs and symptoms are subtle and overlap with disorders such as postoperative ileus. Colon lesions are more dangerous and prone to sepsis with necrotizing fasciitis and septic shock.^{4-7,15-25} The clinical manifestations range from persistent pain, bloating and abdominal stiffness, difficulty in passing gases, fever, tachycardia, tachypnea, dehydration, deterioration of the patient's general conditions and metabolic acidosis. In several cases, the only manifestation that patients had was pain and general deterioration without a tendency for clinical improvement.^{4-7,10,15-25} Patients who undergo lipoaspiration should be closely monitored for the first seven days. When there is a torpid evolution and no tendency for improvement, the patient should be admitted to rule out visceral perforation.

The exploratory laparotomy is a diagnostic and salvage procedure in cases of visceral perforation and sometimes it must be performed in extreme urgency, even when X-rays are not available.^{4-9,15-25} The diagnosis and timely treatment carried out by a general surgeon with experience in this type of cases will satisfactorily resolve most cases. A delay in the patient's attention can have fatal consequences. In most cases, the major problem is not the incident of the injury, but the failure to recognize it.

CONCLUSIONS

Visceral perforations are the second cause of death from lipoaspiration. The factors attributed to this complication are: the surgeon's laco of experience and the factors related to patients, such as: obesity, globular abdomen, presence of umbilical hernias, abdominal scars and fibrotic adhesions caused by surgeries and previous liposuctions. Visceral perforations by liposuction can be of two types: the first group, of extreme urgency appear during surgery or in the first hours postoperative. This group includes tension pneumothorax and hemorrhage due

to injury to organs or large vessels. These conditions require immediate treatment to avoid the patient's death. The second group are bowel injuries, which occur in an insidious way and several days after surgery. Cardinal manifestation is atypical pain, which may be accompanied by intestinal obstruction, fever, and general deterioration. The delay in the diagnosis and treatment leads to poor evolution and high mortality. The exploratory laparotomy is a diagnostic and salvage procedure that must be performed in extreme urgency even when X-rays are not available. In most cases, the major problem is not the incident of the injury, but the failure to recognize it. For all patients who have a liposuction of the abdomen, the first seven days after surgery should be kept under observation. In case of pain and a torpid evolution, visceral perforation should be ruled out. We conducted a systematic review, trying to find the best available medical evidence published. The levels of evidence of the publications found were IV and V. Most publications correspond to a case report or a series of cases. Other publications we used for this work were some revisions and ideas and innovations. There is a need for controlled clinical studies, meta-analysis, laboratory and body research to be able to issue recommendations with a greater foundation.

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SECURITY RECOMMENDATIONS



Visceral perforation by liposuction

Designer: Jonathan Morales



Hernias, rectum diastasis, weakness of the muscular wall



Globose abdomen

Risk factors of visceral perforations in liposuction



Scars of abdominal surgeries



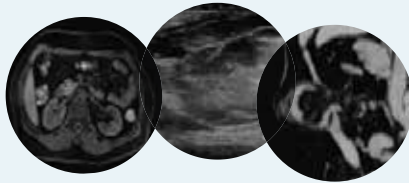
Adhesions and scars after liposuction

Registered deaths are related to the age of the patients and the delay in treatment.
No correlation was found between the incidence and the experience of the surgeon.



Imaging studies to detect abdominal wall defects

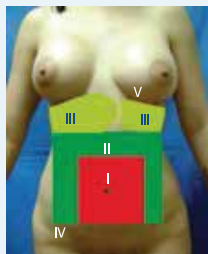
- Ultrasound
- TAC
- Magnetic resonance



A Valsalva maneuver during the study increases sensitivity



- Zone I. Small intestine = 62.5%
- Zone II. Large intestine = 17.5%
- Zone III. Spleen = 7.5%
Liver = 7.5%
- Zone IV. Blood vessels
Cava = 5%
Others = 2.5%
- Zone V = Thorax 2.5%



Viscera damaged by liposuction findings of a meta-analysis

Combined injuries were presented in 10% of cases colon + ileum = 7.5%; liver + pleura = 2.5%
 1 Case was by assisted liposuction with propeller mechanism; rest with usual technique.

Perforated viscera is the second leading cause of death by liposuction. It is an underestimated complication.



The cava vein was damaged in 5% of cases



Hypovolemic shock during surgery or in the first 6 hours it is due to injury of:

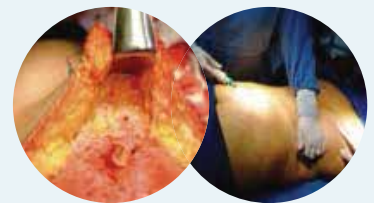
- Liver
- Spleen
- Large blood vessels



Caution

Liposuction of the anterior surface of the abdomen or of the lumbar region, with the patient in lateral decubitus, has the risk of perforation of the cava; the risk increases, if the trunk is in torsion

The combination of liposuction with abdominoplasty increases the risk of visceral perforations



Recommended before surgery



- Training of the surgeon by experts
- Search risk factors
- Know the complications reported
- Routine ultrasound in all patients
- Know the safety recommendations to prevent this complication

Recommended during surgery
Care during infiltration and aspiration to prevent perforation

Avoid using thin cannulas when infiltrating

Infiltration and aspiration only by the surgeon

Hyperextension of the abdomen.
 Pillow on the back or fold the table

If resistance is found, adjust the direction of the cannula position

Constant awareness of the position of the cannula



Feel the tip of the cannula at all times

Extreme care around the navel

Direct the cannula in a tangential direction

Special care in anatomical region changes

Infiltrate the vasoconstrictor solution carefully

All patients: 24-hours hospital surveillance; external consultation for 7 days

Patient with hypovolemic shock
 A perforation of liver, spleen or vena cava should be ruled out

Patient with pain, bloating, nausea, vomiting or intestinal transit disorder
 Bowel perforation should be ruled out



- Keep under observation
- Request studies
- Interconsultation with general surgeon
- Exploratory laparotomy

Studies to be performed on a patient with suspected visceral perforation



- Abdomen X-ray. Liquid or open air in cavities
- Ultrasound. Liquid or open air in cavities or bruises around damaged organs
- CT scan or magnetic resonance imaging-hematomas and leakage with contrast material
- Exploratory laparotomy: It is a salvage measure and should be used even when previous studies are not available

Recommended after surgery

Keep under observation for at least 24 hours

Check in surgeon's office at 48 hours

Look for unusual and persistent pain

Identify data of dehydration or attack on the general state

Search intestinal obstruction



Identify hypovolemic shock

Search peritonitis

Identify skin alterations of the operated areas

Identify signs of sepsis, such as: tachycardia and fever

In case of doubt: hospitalize the patient and conduct studies

The delay in patient care produces:

- Peritonitis
- Dermal cutaneous necrosis
- Necrotizing fasciitis septic
- Shock
- Death



Intestinal perforation by liposuction