Case report

Importance of sympathectomy induced by continuous brachial plexus block for digital replantation in a patient with liver cirrhosis: Case report

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ABSTRACT

Hand microsurgeries are procedures performed by reconstructive surgeons and require a complex and highly individualized approach. The management of anesthesia in patients with cirrhosis may be challenging. Liver dysfunction may condition the extended use of anesthetic agents as a result of a disrupted metabolism and clearance.

This case describes the anesthetic management of a patient with cirrhosis, using a combined anesthetic technique with continuous axillary block of the brachial plexus to prevent postoperative pain and maintain extended vasodilatation. The continuous brachial plexus block under local anesthesia has shown improved tissue perfusion following limb replantation surgery. This technique is particularly helpful to prevent vasoospasm in the reconstructed tissue during the postoperative period. In patients with cirrhosis, this technique provides adequate postoperative pain control.

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Importancia de la simpatectomía inducida por el bloqueo continuo del plexo braquial para la cirugía de reimplante digital en un paciente con cirrosis hepática: reporte de caso

PALABRAS CLAVE:
Cirrosis hepática
Bloqueo nervioso
Microcirugía
Plexo braquial
Anestesia

RESUMEN
Las intervenciones de microcirugía sobre la mano son procedimientos realizados por cirujanos reconstructores que requiere un abordaje complejo y altamente individualizado. El manejo anestésico en pacientes con cirrosis puede ser difícil. La disfunción hepática puede condicionar una duración prolongada de los fármacos anestésicos por un metabolismo e índice de aclaramiento alterados.
Describimos el manejo anestésico de un paciente con cirrosis, empleando una técnica anestésica combinada con bloqueo axilar continuo del plexo braquial para prevenir el dolor posoperatorio y mantener una vasodilatación prolongada. El bloqueo continuo del plexo braquial con anestésicos locales ha mostrado mejorar la perfusión tisular tras la cirugía de reimplante de miembros. Esta técnica es especialmente beneficiosa para prevenir el vasoespasmo en el tejido reconstruido en el periodo posoperatorio. En los pacientes cirróticos, esta técnica ofrece un adecuado control del dolor posoperatorio.

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Introduction
The continuous brachial plexus block (CBPB) in digital replantation surgery offers numerous advantages in terms of the best graft perfusion1–3. Patients with liver disease are at high risk of perioperative morbidity and mortality due to the effects of surgery and the drugs used, that may further deteriorate the baseline condition leading to liver decompensation4. The metabolism of most opioid drugs is slow5, with a long half-life and increased risk of respiratory depression.

Clinical case
This is a 46 year-old patient with traumatic amputation of the proximal phalanx of the first and second digits (Fig. 1). The personal history highlights liver cirrhosis due to stage A according to the Child–Turcotte–Pugh classification and surgical resection of the liver carcinoma. Following the evaluation of the patient by a multidisciplinary team including plastic surgeons, trauma surgeons and anesthesiologists, the decision was made to do digital replantation. The complementary tests including complete blood count, biochemistry and coagulation tests were all unremarkable.

Upon the usual non-invasive blood pressure monitoring, ECG, pulse oximetry (SpO2), neuromuscular block using the TOF watch SX monitor and placement of an electric blanket, 3 mg of midazolam were administered to reduce anxiety. The patient was placed in decubitus supine with the arm abducted at 90° with regard to the trunk. The axillary artery was localized with ultrasound and the medial, ulnar, musculocutaneous and radial nerves were identified, for a needle approach of the plexus plane. The catheter was inserted into the perivascular fascia compartment of the brachial plexus to maintain continuous anesthesia with an initial 0.2% ropivacaine dose of 20 ml. An anesthetic induction then followed with propofol 150 mg, fentanyl 150 μg and cisatracurium 18 mg and the patient was intubated and connected to mechanical ventilation. 1 CAM sevoflurane and continuous infusion of ropivacaine 0.2% at 6 ml/h were used for maintenance of the anesthesia through a nerve catheter. The patient was hemodynamically stable during the intraoperative period of 5h. The first digit was remodeled and the anastomosis of the vascular pedicles was performed, maintaining adequate level of analgesia. At the end of the procedure the patient was extubated and transferred to the postoperative care unit. The patient had a satisfactory evolution during the postoperative period, demonstrating good distal perfusion according to

Fig. 1 – Traumatic amputation of the first and second digit
Source: Authors.
Doppler ultrasound and pulse oximetry of the re-implanted digit. The axillary catheter was kept in place for continuous perfusion of ropivacaine 0.2% at 6 ml/h for 72 h, with adequate analgesia and a visual analog scale (VAS) score < 3; no adjuvant analgesia was needed, no neural lesions were identified and the patient was free of complications.

**Discussion**

The axillary approach to Brachial Plexus Blockade under local anesthesia is a technique widely used by anesthesiologists, because of its analgesic efficacy and low risk of complications. It has shown to improve the digital tissue perfusion following replantation microvascular surgery as a result of the sympathetic block and the associated vasodilatation, decreasing the risk of postoperative vasospasm in areas where the peripheral circulation may be compromised with subsequent rise in temperature.

CBPB provides the best analgesia during the postoperative period as the main indication for this block, and is the ideal analgesic technique for limb reimplantation surgery. Because of the few healthcare centers that do this type of surgery, few cases have been described. There are other indications however for CBPB: vascular insufficiency resulting from vasoactive drug therapies, trauma hand injuries, digital amputations, long upper limb surgery, and complex regional pain syndrome. Regional anesthesia maintains extended and continuous vasodilatation of the operated limb, decreasing the risk of postoperative vasospasm in areas where the peripheral circulation may be compromised with subsequent rise in temperature.

Liver cirrhosis presents an increased risk of coagulopathy. The correction of coagulopathy is controversial, since the volume expansion may promote bleeding and raise the portal pressure, resulting in an imbalance of the pro and anti-coagulant factors. This approach shall be reserved for active bleeding situations and evidences a deficit in coagulation factors.

Right ventricle ejection fraction catheter monitoring and trans esophageal echocardiography are recommended, particularly in intra-abdominal surgery and MELD > 10, as it is considered a high-risk procedure.

Liver disease poses a high risk of perioperative morbidity and mortality because of the effects of surgery and anesthesia on the liver. Various prognostic evaluation scales have been used, such as the Child–Turcotte–Pugh classification (Table 1) or the mathematical model to predict survival of patients with end-stage disease (MELD – Model for End-stage Liver Disease). The model evaluates creatinine and bilirubin levels, the International Normalized Ratio (INR), prothrombin time (PT), and the etiology of liver disease.

Some authors suggest that a patient with a MELD < 10 may undergo elective procedures; a MELD from 10 to 15 indicates that the elective surgery may be done with the potential of surgery-related side effects. A MELD > 15 is indicative of a patient who is a candidate for liver transplant and elective surgery should be avoided. The case under discussion with A Child classification and MELD > 10, is associated with a moderate anesthetic risk.

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**Table 1 – Child–Turcotte–Pugh modified classification. Classes A: 5–6; B: 7–9; C: 10–15.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum albumin (g/dL)</td>
<td>&gt;3.5</td>
</tr>
<tr>
<td>Prothrombin time (prolonged seconds)</td>
<td>2.8–3.5</td>
</tr>
<tr>
<td>INR</td>
<td>&lt;2.8</td>
</tr>
<tr>
<td>Prothrombin time (prolonged seconds)</td>
<td>2.8–3.5</td>
</tr>
<tr>
<td>INR</td>
<td>&lt;2.8</td>
</tr>
<tr>
<td>Bilirubin (mg/dL)</td>
<td>4–6</td>
</tr>
<tr>
<td>Bilirubin in primary biliary cirrhosis or primary sclerosing cholangitis</td>
<td>6</td>
</tr>
<tr>
<td>(mg/dL)</td>
<td>&gt;6</td>
</tr>
<tr>
<td>Ascites</td>
<td>1.7–2.3</td>
</tr>
<tr>
<td>Encephalopathy</td>
<td>2.3</td>
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</tbody>
</table>
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metabolism due to plasma stearases, becomes the opioid drug of choice for the intraoperative period\textsuperscript{15}. The use of NSAIDs\textsuperscript{15} presents some limitations in liver failure because the inhibition of the prostaglandin synthesis has the potential to exacerbate the vasoconstriction of the renal arteries resulting from the presence of vasoconstrictive substances\textsuperscript{15} (i.e., angiotensin II or noradrenaline).

In summary, a combined anesthetic technique is considered the best anesthetic strategy for digital replantation surgery, where CBPB optimizes distal perfusion and improves the graft survival, preventing the development of vasospasm in the digital arteries of the re-implanted digit\textsuperscript{17,18}. The management of anesthesia in the presence of liver dysfunction involves consideration of drug metabolism, hyperdynamic circulation, perioperative hypoxemia and risk of bleeding\textsuperscript{14}.

**Ethical disclosures**

**Protection of human and animal subjects.** The authors declare that no experiments were performed on humans or animals for this study.

**Confidentiality of data.** The authors declare that no patient data appear in this article.

**Right to privacy and informed consent.** The authors declare that no patient data appear in this article.

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**Conflict of interest**

The authors declare no conflict of interest.

**REFERENCES**


