Brachial Plexus Lesions in Breast Surgery. Recommendations for Prevention☆

Lesiones del plexo braquial en la cirugía mamaria. Recomendaciones para su prevención

Dear Editor,
In a recent article in your journal, Colsa Gutiérrez et al.1 reviewed intraoperative injuries to peripheral nerves in colorectal surgery. As in abdominal surgery, breast surgery can lead to neurological injuries during the immediate postoperative period that are not related with the surgical technique but instead with the positioning of the patient on the operating table. Therefore, a critical analysis of each case is necessary for the prevention of these adverse effects and to improve patient safety, which are the responsibility of medical professionals. In this Letter to the Editor, we will describe our experience in neurological lesions after breast surgery in order to discuss possible causes and, above all, recommendations to avoid them.

Between January 2000 and June 2015, 1501 surgical procedures were performed in women with breast cancer. During the immediate postoperative period, 4 neurological deficits were observed secondary to injury to the brachial plexus, which was an incidence of 0.002% (Table 1). The surgical techniques performed were mastectomy with axillary lymph node dissection, bilateral vertical mammoplasty, latissimus dorsi flap reconstruction and replacement of breast expander with definitive prosthesis. The mechanisms related with neurological injury were diverse and included the use of retractors on the brachial plexus, hyperabduction of the upper extremity and its elongation in lateral decubitus (Fig. 1). In one case, axillary fibrosis secondary to radiotherapy predisposed the patient to functional limitation prior to surgery, which conditioned the appearance of postoperative paralysis in spite of the correct placement of the limbs during the intervention. The neurological deficits affected the sensitivity and mobility of the upper limb, and recovery was variable (between 6 and 28 weeks). The patients were evaluated by the rehabilitation unit, and all were diagnosed with injury to the brachial plexus (neuapraxia), with no evidence of distal nerve injury in any of the cases. The 4 patients recovered their neurological function, although one presented chronic sensory neuropathy in the proximal region of the upper extremity.

Iatrogenic injury to the brachial plexus is an uncommon occurrence in breast surgery, and its exact incidence is unknown because most authors have published isolated cases of neurological injury.2 Breast surgery presents factors for the appearance of paralysis of the brachial plexus; oncoplastic and reconstructive procedures are characteristically long in duration and involve postural changes as well as the need for positioning the upper limbs in abduction.3–4 This predisposition affects not only oncological procedures but also later reconstructive surgeries, where manipulation of patient position is also required.5 The explanation of this predisposition lies in the vulnerability of the brachial plexus due to its anatomical factors: its attachment between fixed points (foramen and axillary fascia), its passage through a narrow canal between the clavicle and first rib, its relationship with bony protuberances (head of the humerus and ulna),3–4 and the fibrosis of the axillary canal after radiation.6

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Table 1 - Clinical Characteristics of the Patients With Neurological Injury After Breast Surgery.

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Appearance of symptoms</th>
<th>Surgery</th>
<th>Surgery duration</th>
<th>Precipitating factors</th>
<th>Neurological deficit</th>
<th>Type of neurological injury</th>
<th>Time until stabilisation</th>
<th>Sequelae</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>Female</td>
<td>Immediate</td>
<td>Mastectomy and axillary lymphadenectomy Latissimus dorsi flap</td>
<td>150 min</td>
<td>Placement of separator over brachial plexus Stretching of the upper extremity</td>
<td>Sensory and motor</td>
<td>Neurapraxia of the brachial plexus</td>
<td>10 weeks</td>
<td>None</td>
</tr>
<tr>
<td>50</td>
<td>Female</td>
<td>Immediate</td>
<td>Mammoplasty vertical</td>
<td>300 min</td>
<td>Hyperabduction of upper extremity</td>
<td>Sensory and motor</td>
<td>Neurapraxia of the brachial plexus</td>
<td>28 weeks</td>
<td>Sensory deficit in the proximal upper limb</td>
</tr>
<tr>
<td>36</td>
<td>Female</td>
<td>Immediate</td>
<td>Replacement of breast expander</td>
<td>140 min</td>
<td>Axillary and suprACLavicular radiotherapy</td>
<td>Sensory and motor</td>
<td>Neurapraxia of the brachial plexus</td>
<td>6 weeks</td>
<td>None</td>
</tr>
<tr>
<td>47</td>
<td>Female</td>
<td>Immediate</td>
<td></td>
<td>100 min</td>
<td></td>
<td>Sensory and motor</td>
<td>Neurapraxia of the brachial plexus</td>
<td>7 weeks</td>
<td>None</td>
</tr>
</tbody>
</table>

Surgery are responsible for preventing neurological injuries, and they should therefore ensure correct placement of these patients during surgery. There are 4 basic recommendations for the prevention of these injuries. The first is to avoid direct injury with surgical instruments, especially during manipulation in axillary lymph node dissection. The second recommendation is to limit the abduction of the upper extremity, using axillary node dissection to avoid the use of excessive traction. The third recommendation is to avoid excessive traction during the dissection of the deltoid muscle flap. In conclusion, the presence of a lesion to the brachial plexus is caused by the combination of several factors, including excessive traction on the nerve, rotation of the head, and direct compression on the nerve. In these cases, the greater risk of the lymph node chains, as well as the relationship of the lymph nodes, is needed to prevent injury to the peripheral nerves.
Gastric Hernia After Tubular Gastroplasty\textsuperscript{☆}

Hernia gástrica secundaria a gastroplastia tubular plicada

Dear Editor,

We have read with interest the original article published in your journal by Dr. Pujol Gebelli et al.,\textsuperscript{1} which reviewed the cases of patients treated at their hospital with laparoscopic gastric plication. We have recently treated a patient with a gastric hernia that resulted as a complication of this technique.

The patient is a 51-year-old patient who had undergone gastric plication for obesity (BMI: 36) and also presented arterial hypertension treated with valsartan. The postoperative period transpired without incident. In the first month, the patient’s blood pressure levels had normalised and antihypertensive treatment was suspended. Five months after surgery, the patient presented a weight loss of 32 kg.

Also five months post-op, and after having been asymptomatic previously, the patient came to the emergency room of our hospital with abdominal pain and vomiting that had been progressing for several hours. During the examination, the abdomen was soft, painful in the epigastrium, with no guarding or signs of peritoneal irritation. Abdominal CT showed evidence of a herniated stomach through the gastroplasty suture (Fig. 1).

Given these radiological findings, urgent surgery was indicated, at which time we observed the gastric fundus herniated through the gastroplasty in the greater curvature. We released the herniated tissue, completely disassembled the gastroplasty, and were able to clearly observe the area of the fundus that presented vascular compromise. We performed a sleeve gastrectomy with mechanical sutures (Fig. 2) and reinforced the staple line with Prolene\textsuperscript{6} 3/0. The postoperative period was uneventful and the patient was discharged on the 5th day post-op.

Gastric plication is one of the new restrictive techniques within the arsenal of bariatric surgery that is still in the validation period and the process of defining its indications as well as perioperative management.\textsuperscript{2-4} It is a variation of vertical sleeve gastrectomy with the theoretical advantage of presenting a lower possibility for complications as it does not require resection\textsuperscript{3,4} and thus avoids the much-feared leakage in the proximal gastric suture. It is also a potentially reversible technique. Complications, if they appear, are usually early-onset and can include sialorrhea, nausea and vomiting, which generally recede in the first few days.

In our case, we were faced with a severe late-onset complication that required urgent reoperation that was resolved with a reconversion to sleeve gastrectomy.

The particularity of this case, unlike the case published by Dr. Pujol and other publications reviewed in the literature, is that the complication occurred 5 months after surgery, and the patient had experienced a postoperative period with no

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\textsuperscript{1} Wu JD, Huang WE, Huang ZY, Chen M, Zhang G. Brachial plexus palsy after a left side modified radical mastectomy with immediate latissimus dorsi flap reconstruction: a report of a case. World J Surg Oncol. 2013;11:276.


