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Trendelenburg-Related Brachial Plexus Injuries in Robotic-Assisted Surgery: A Case Report

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Background

Brachial plexus injury is among the most frequent peripheral nerve injuries related to intraoperative positioning. In robotic gynecologic surgery, the Trendelenburg position, defined as a head-down tilt in the supine posture, is commonly adopted, and prolonged positioning may increase the risk of brachial plexus injury through cephalad displacement and shoulder fixation–related traction and compression.

Case Description

A 55-year-old woman with no significant past medical history underwent robot-assisted laparoscopic hysterectomy with bilateral salpingo-oophorectomy for endometrial cancer. She was 163 cm tall and weighed 61 kg (body mass index, 22.96 kg/m²). The operation lasted 325 minutes, during which she was maintained supine in a steep head-down (Trendelenburg) position with approximately 45° tilt. The left arm was pronated, abducted to <90° , and secured on an anesthetic arm board. Bilateral shoulder supports were applied to prevent cephalad sliding, and the upper extremities were additionally secured with straps at the mid-humeral level. Immediately after surgery, she was unable to move her left arm and reported numbness. One day postoperatively, she was referred to our department for evaluation of left upper-extremity weakness. On neurologic examination, weakness was noted in the elbow flexors and extensors, wrist extensors, finger flexors, and finger abductors, with decreased sensation over the medial aspect of the left forearm. Contrast-enhanced brachial plexus magnetic resonance imaging on postoperative day 1 revealed no enhancing lesion or definite structural abnormality of the left brachial plexus; mild degenerative cervical spondylosis was observed. Three weeks after symptom onset, electrodiagnostic studies were performed. Sensory nerve conduction studies demonstrated an abnormal left medial antebrachial cutaneous nerve with reduced sensory nerve action potential amplitudes compared with the right side. Motor nerve conduction studies were within normal limits, and studies on the unaffected side were normal. Needle electromyography showed abnormal spontaneous activities in the left biceps brachii, flexor carpi radialis, first dorsal interosseous, and abductor pollicis brevis muscles, with discrete to reduced interference patterns on maximal volition in the same muscles.

Conclusion

We report a case of postoperative brachial plexopathy involving the medial cord following prolonged robot-assisted surgery in steep Trendelenburg positioning. The superficial location of the brachial plexus makes it vulnerable to traction and compression. In robot-assisted gynecologic surgery, steep Trendelenburg positioning, arm abduction, and shoulder supports increase the risk of injury. Shoulder supports may depress the clavicle and humeral head, increasing abduction and predisposing the plexus to stretch and compressive ischemic injury. Understanding these mechanisms is essential for prevention as robotic surgery becomes more widespread.

Nerve	Stimulating site	Recording site	Latency (ms)	Amplitude(uV)	Distance
R MABC	Medial antecubital fossa	Medial forearm	2.3	23	12
L MABC	Medial antecubital fossa	Medial forearm	2.3	8	12
R Ulnar	Wrist	5th digit	2.7	51	14
L Ulnar	Wrist	5th digit	2.8	46	14

Table 1.
Findings of the sensory nerve conduction study in the upper extremities
MABC: Medial antebrachial cutaneous

Muscle	IA	ASA	MUAP	Recruitment pattern
L Biceps brachii	Normal	F(++),P(+++)	Polys	Reduced
L Flexor carpi radialis	Normal	F(++),P(+++)	Polys	Discrete
L First dorsal interosseous	Normal	P(++)	Polys	Reduced
L Abductor pollicis brevis	Normal	P(+)	Polys	Reduced

Table 2.
Findings of the needle electromyography study in the left upper extremity.
IA: insertional activity, ASA: abnormal spontaneous activity, MUAP: motor unit action potential, F:fibrillation potentials, P: positive sharp waves