Teleconsultation in the event of an acute complication after a brachial plexus block

INTRODUCTION

Immediate help to a novice or a professional practising anaesthesiologist in fine tuning techniques as well as guidance during complications are the hallmarks of good anaesthesiologists. Anaesthesiologists performing regional nerve blocks in remote and rural areas are devoid of modern gadgets, and are dependent on anatomical landmarks. The supraclavicular brachial plexus blocks have been associated with catastrophic complications. Split second decisions are made to normalise these situations. A mind block might set in, if it is a single-working anaesthesiologist with limited or untrained staff.

This article describes how the first author, with the help of his colleagues, could normalise the situation in four patients after blocks above the clavicle led to catastrophes. All complications were discussed over the cell phone to normalise the situation.

CASE PRESENTATION

From 2010 to 2021, a total of four patients [C1, C2, C3, and C4] were tele-consulted for various complications immediately after a block above the clavicle. Information regarding the patient demographics, tier of place, type of surgery and proposed block details, immediate complications, intervention, and the outcomes was recorded [Table 1].

Immediately after the block, C1 became unresponsive to verbal commands, oxygen saturation dropped, and bradycardia ensued. In C2 and C3, after multiple attempts of anatomical landmark-guided block failed, a neurostimulation-guided interscalene block was administered, following which, the patient developed bradycardia and apnoea ensued. In C4, after a left-sided interscalene block (22 mL) and surgery, right-sided 10 mL injection for interscalene block led to hypopnoea.

In C1, the call was placed after intubation, whereas in C2, C3, and C4, the calls were placed during bag and mask ventilation. The calls were answered within 5 min after the last call. The time elapsed between last call and dialled call was 3, 2, 4, and 5 min, in C1, C2, C3, and C4, respectively. Brief discussion included immediate shift to anaesthesia machine, intubation and ventilation with air/nitrous-oxide in oxygen, intravenous [iv]atropine and mephentermine to mitigate haemodynamic instability, iv midazolam to decrease awareness, maintaining haemodynamic stability, discussing with the surgeon the possibility of completing the surgical procedure, informing and counselling the patient’s relatives, and a thorough neurological assessment in the postoperative period until discharge from hospital [Figure 1].

After teleconsultation (with the surgeon and concerned anaesthesiologist), it was decided to perform surgical procedures in C1 and C2 patients. The surgeon, in C3 and C4 patients (left surgery was performed, right side was postponed) declined to operate, and preferred a later date. The surgical procedure in C1 and C2 patients was uneventful under light general anaesthesia.

Postoperatively, the trachea was extubated after an hour with the patient fully conscious, oriented with adequate return of muscle tone and airway reflexes, and haemodynamically stable without vasopressors/inotropes. Patients (C1 and C4) did not exhibit pain on the operated side. Examination of the peripheral nervous system on the operated side exhibited a sensory loss in the distribution of C4, 5, 6, 7, 8, and T1. Bilateral decreased sensations were noted on the chest at the T1, T2, and T3 levels in all patients. On the contralateral side, hand grip was weak and so was elbow flexion, though sensations were preserved in the entire upper limb [C5, C6, C7, and C8]. Though unoperated, a similar pattern was noted in C3 and C4. The following day, a detailed examination by a neurologist did not divulge neurological dysfunction. Patients were discharged on the fifth postoperative day without any residual neurological adverse effects.

DISCUSSION

Teleconsultations are defined under the broader term “telemedicine”, which offers medical knowledge over a distance using telecommunication technology provided that an adequate telecommunication network exists. This aims to improve medical services in the rural and remote areas and provide an immediate access to medical colleagues.[1]

Tele-pre-anaesthesia evaluation and consultation, especially in the pain clinic and intensive care units during the coronavirus disease-19 pandemic times,
have been found to provide a reliable assessment.[2-4] They have been found to prevent the cancellation of cases[2] and video teleconferencing with realistic simulation in anaesthesia has been reported to have been used for conducting long-distance clinical case discussions for a large audience from different areas.[5] Surgical consultations have been performed for laparoscopy and open surgeries in very remote areas through landline and satellite phones.[6] A case report of remote anaesthesia monitoring is mentioned in literature.[7,8]

Case counselling is routinely carried out with anaesthesiologists from remote areas by the first author of this article to deal with challenging cases to be performed under regional anaesthesia. Though respiratory complications secondary to interscalene blocks are mentioned in literature, handling a regional anaesthesia catastrophe in a tier II or III environment (remote/rural setting) is a very challenging situation, with a single anaesthesiologist requiring immediate help after a catastrophe. The primary aim is to stabilise the patient, assess the need for intubation and ventilation, stabilise haemodynamics with or without vasopressors/inotropes, and estimate the probable brain damage. The secondary aim is to inform the surgeon about the complication and to counsel the surgeon.

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**Table 1: Summary of demographics, surgery, block performed, complications and outcome**

| Demographics | ASA‑PS/ Surgery | Block Type | End‑Point | Volume and Local Anaesthetic | Immediate Complications | Intervention | Outcome |
|--------------|-----------------|------------|-----------|------------------------------|-------------------------|-------------|---------|
| C1 Age 44 years/Male | Tier 2 | I Left Proximal Humerus | AL‑ISB | Shoulder paraesthesia 30 ml 0.5% BUP Boluses of 5-7 mL | Apnoea | I and V | Left proximal humerus done; No Neurodeficit. |
| C2 Age 35 years/Female | Tier 2 | I Right Proximal Humerus | NS‑ISB DMR 0.4 mA | Attempted AL – 3 pricks ‑abandoned – shifted to NS-15 0.5% BUP 5 mL boluses | Bradycardia Hypoventilation, Apnoea | Atropine/Meph | Right proximal humerus done; No Neurodeficit. |
| C3 Age 67 years/Male | Tier 2 | II Left Proximal Humerus | NS‑ISB DMR 0.4 mA | Attempted AL – 4 pricks ‑abandoned – shifted to NS-15 0.5% BUP 5 mL boluses | Bradycardia Hypoventilation, Apnoea | I and V | Left proximal humerus postponed. |
| C4 Age 26 years/Male | Tier 1 | I Left and Right Proximal Humerus | NS‑ISB | Left=DMR 0.4 mA Right=BMR 0.4 mA | Left 22 ml 0.5% BUP After Right=10 ml 0.5% BUP, developed respiratory problems | After Right=10 ml 0.5% BUP, developed respiratory problems Hypoventilation, SaO2=70-72% on 100% O2 | I and V | Right proximal humerus postponed. |

AL=Anatomical Landmark, ISB=Interscalene Block, BUP=Bupivacaine, NS=Neurostimulation, DMR=Deltoid Motor Response, BMR=Biceps Motor response, I and V=Intubation and Ventilation, Atr=Atropine, Meph=Mephentermine, HD‑N=Haemodynamics Normal, C1=Case 1, C2=Case 2, C3=Case 3, C4= Case 4; SaO2=Peripheral oxygen saturation

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**Figure 1: Road Map to Successful Outcome**

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Diwan, et al.: Telecommunication in regional anaesthesia
relatives as a team. The tertiary aim is to complete the surgery if relatives/surgeon consent to it.

It is important that the call is placed after the patient is stabilised. The receiver needs to know the circumstances and environment under which the caller is handling the case, the mind-set of the surgeon and the relatives, the rapport with the surgeon and the availability of a specialist (cardiologist/intensivist). Based on these cases, we propose a road map for a successful outcome [Figure 1].

Apart from case management, all practising anaesthesiologists in remote and rural areas need to know the limitations of their respective working zones. An update in regional anaesthesia available on various social media platforms is highly appreciable. Attending accredited regional anaesthesia workshops once in a year should be a priority. Upgradation with modalities like neurostimulation and ultrasound, if possible, is a welcome decision. Moreover, the operation theatre staff should be made aware of grasping early signs of impending complications [for example, bradycardia and sweating during injection].

Simply understanding that high volumes of local anaesthetic injected in the interscalene groove can translocate into the neuraxial space leading to brief brain-stem anaesthesia might help in reducing the volumes of the local anaesthetic agents used.[9] It is also imperative to understand that the same “shoulder paraesthesia” may be elicited with the needle tip lying in the C6 intervertebral foramina or in the interscalene groove, with the former leading to catastrophic outcomes.[9]

The pores and channels in the investing layer of cervical fascia communicate with deeper structures.[10] The multiple pricks with anatomical landmark-guided attempts in cases C2 and C3 may have created multiple paths for the local anaesthetic to seep into the neuraxial space and elsewhere, as apnoea was delayed. In C4, we postulate that in the tenable existence of a left phrenic paresis, a right interscalene block would have led to bilateral diaphragmatic paresis. A bilateral interscalene block should be discouraged, since grade I evidence exists of phrenic nerve paresis with ultrasound injection of more than 5 mL in the interscalene groove.[11] De facto, the sensory and motor affection on the contralateral side confirms the epidural spread of local anaesthetic after interscalene block. Nevertheless, ultrasound-guided blocks are associated with better outcomes and fewer complications.[12]

CONCLUSION

We emphasise the role of teleconsultation in the event of an acute complication related to regional anaesthesia. The caller is expected to stabilise the patients before alerting his colleague. The receiver should be responsive, courteous, knowledgeable, prompt, and honest in his service. No disservice is expected from the receiver who manages his patient while discussing with the caller.

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Conflicts of interest
There are no conflicts of interest.

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