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SCIENTIFIC LETTERS

A new thoracic interfascial plane block as anesthesia for difficult weaning due to ribcage pain in critically ill patients

Nuevo bloqueo del plano interfascial torácico como anestesia para retiradas dificultosas de ventilación mecánica a causa de dolor torácico, en pacientes críticos

Interfascial plane block of anterior and lateral cutaneous branches of intercostal nerves, known as pecto-intercostal fascial plane block (PIFB) and serratus–intercostal plane block (SIFB), is an anesthetic procedure for ribcage anesthesia not previously reported in the setting of critical care. A similar anesthetic technique has proven adequate pain control during and after abdominal and breast surgery.[1–5]

Patients with chest trauma and rib fractures or patients with endothoracic drainage tubes (EDTs) often need deep sedoanalgesia, hindering weaning. The use of ultrasound-guided interfascial plane block in critically ill patients opens up several possibilities to improve pain control, decreasing the need of other forms of conventional analgesia.

Description of interfascial plane block

For carrying out PIFB a linear ultrasound (US) probe is placed at 2 cm from the sternal body. On the surface plane, the subcutaneous tissue is identified, in the intermediate plane, the pectoralis major muscle, the intercostal muscles and the ribs, and in the deep plane, the pleura and the lungs (Fig. 1).

A needle is introduced following the lower edge of US probe, directing the tip from the bottom of the sternum and positioning the needle tip between the pectoralis major and the external intercostal muscles.

Twenty milliliters of a solution of 0.25% levobupivacaine plus epinephrine (5 mcg/ml) are diluted in 250 ml of 0.9% sodium chloride solution. Anesthetic boluses of 5 ml are introduced to perform hydrodissection of the interfascial plane. The catheter must be allocated 3–5 cm beyond the tip of the needle and is connected to an elastomeric pump, containing the anesthetic solution, at the infusion rate of 5 ml/h.

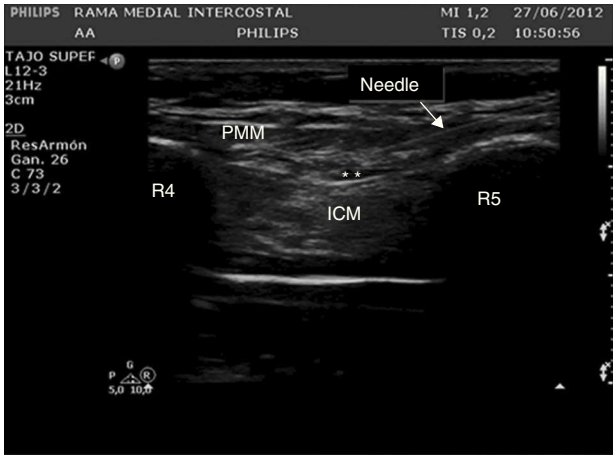

Figure 1 Ultrasound of the chest wall showing the structures visualized in the anterior chest. PMM: pectoralis major muscle; ICM: intercostal muscles; R4: fourth rib; R5: fifth rib; * denotes hydrodissection of the interfascial plane with the anesthetic solution inside this space. The arrow points the position of the needle crossing from the subcutaneous tissue up to the interfascial plane.

For SIFB, US probe is located on the lateral thoracic longitudinal axis, at the midaxillary line. On the surface plane subcutaneous tissue is identified, in the intermediate plane the anterior serratus muscle, the ribs and the intercostals muscles and in the deep plane the pleura and the lung. The needle is located between the serratus anterior muscle and the external intercostal muscle (Fig. 2). The needle is directed following the lower edge of US probe, from caudal to cranial, to locate it between the serratus anterior and the external intercostal muscles. Hydrodissection of the interfascial plane is made and 3 ml of the anesthetic solution is administered for every segment desired to be blocked. The catheter is allocated 3–5 cm beyond the tip of the needle and is connected to the elastomeric pump.

Case 1

A 31-year-old man was admitted to the intensive care unit (ICU) due to severe community-acquired pneumonia and acute respiratory distress syndrome. Orotracheal intubation and prolonged mechanical ventilation were needed.

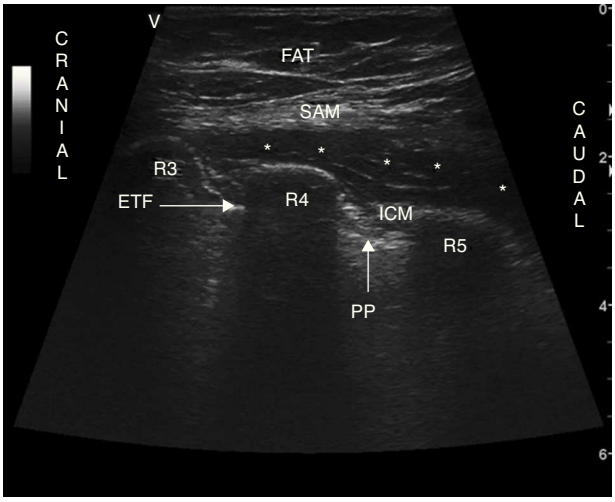

Figure 2 Ultrasound of the chest wall showing the planes visualized in the lateral chest. SAM: serratus anterior muscle; ICM: intercostal muscles; R3: third rib; R4: fourth rib; R5: fifth rib; PP: parietal pleura; ETF: enthoracic fascia; FAT: subcutaneous fat; * denotes hydrodissection of the interfascial plane with the anesthetic solution inside this space.

Bilateral pneumothorax complicated respiratory progress. EDTs were placed on the left (lateral and anterior) and on the right (upper) chest.

When the weaning was thought to be suitable, three days after EDTs placement, sedoanalgesia with a morphine chloride infusion (0.42 mcg/kg/min) and propofol (55.56 mcg/kg/min) were needed because of severe ribcage pain when sedation windows were planned in multiple attempts of weaning. Sedative drugs hindered an adequate level of consciousness and collaboration for weaning.

PIFB was thought to be the best option for ribcage pain management. Five hours after the start of PIFB, intravenous sedative drugs were withdrawn and the patient could be extubated 1 h later. The following days, the patient remained painless, not requiring any other analgesic. On the seventh day, PIFB catheters were removed. No germs grew in the cultures of catheters.

Case 2

A 61-year-old man was admitted to the ICU after thoracic trauma. The patient showed fractures from the third to the eleventh ribs on the right thorax, fractures from the third to the twelfth ribs on the left thorax, fractures of the left L1–L4 transverse apophysis, fracture of the sacrum and fracture of the right iliac blade.

The patient required endotracheal intubation and mechanical ventilation due to respiratory failure, and surgery for pelvic external fixation. Sedoanalgesia with mizadolam (7.5 mcg/kg/min) and morphine chloride (0.5 mcg/kg/min of) was started.

Four days later, in anticipation of an expected difficult weaning, SIFB was performed on both hemithorax with an infusion of levobupivacain 0.0625% at a 10 ml/h rhythm. The concentration of levobupivacain infusion was intentionally reduced, with an increased infusion rhythm (larger volume infused) to achieve a wider spread of the anesthetic, due to patient obesity (body mass index, 34.6). After 5 h of levobupivacain infusion, midazolam and morphine chloride were withdrawn. Metamizol (2 g/6 h, IV) and paracetamol (1 g/6 h) were prescribed due to painful fractures outside the chest. Dipotassium clorazepate (20 mg/8 h, IV) and clonidine (300 mg/8 h, through the nasogastric tube) were initiated to prevent deprivation syndrome. Ninety hours after intravenous midazolam and morphine chloride were withdrawn, the patient was awake and collaborative. He showed no ribcage pain and he was extubated successfully in the first attempt. The patient denied ribcage pain after extubation, even with mobilizations.

Catheters were kept in place for ten days and its cultures were sterile.

Comments

PIFB and SIFB have not been described previously as anesthesia for critically ill patients.

In Case 1, PIFB was clearly effective for ribcage pain control, preventing prolonged weaning and avoiding the use of other analgesic drugs. In Case 2, anti-inflammatory drugs were added for pain due to pelvis and vertebral fractures. Anyway, the use of non-steroidal anti-inflammatory agents appeared to be insufficient for the control of pain after multiple and bilateral rib fractures. The patient could not be extubated before sedative drugs had no effects on consciousness; ribcage pain was not an obstacle for weaning after PIFB was initiated.

The patients we report were pain free even with cough and mobilization after PIFB and SIFB. Elastomeric pumps were changed every 48 h. No significant increase in the nursing staff workload, compared to administration of intravenous analgesics, was needed.

Possible PIFB and SIFB indications in ICU may include chest trauma (sternum and/or ribs fractures), thoracic and heart surgery, EDT maintenance, etc.

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Mucormicosis en pacientes con trauma grave

Mucormycosis in severe trauma patients

La mucormicosis (zigomicosis) es una infección necrosante producida por hongos de la clase Zigomicetos y el orden mucoral. Se trata de una enfermedad de curso fulminante, asociada a bajas tasas de supervivencia, relacionadas en general con un diagnóstico precoz y un tratamiento quirúrgico-antibiótico agresivo[1]. Habitualmente, se asocia a individuos con factores de riesgo, como puede ser la diabetes mellitus, el tratamiento con glucocorticoides a altas dosis, los trasplantes de médula ósea u órganos sólidos, la neutropenia o las enfermedades neoplásicas, aunque también está descrita su aparición en individuos inmunocompetentes sin dichos factores de riesgo[1-6].

La enfermedad traumática grave, descrita como un *injury severity score* (ISS) mayor de 16, es considerada, basándose en casos aislados, un factor de riesgo para la aparición de este tipo de infecciones fúngicas invasoras, no quedando completamente aclarada su incidencia real[1,5-7].

A continuación, se presenta una serie de casos de mucormicosis asociada a la enfermedad traumática, cuyas características principales pueden verse en la tabla 1.

Se trata de una infección poco frecuente, aunque cuya incidencia se encuentra en aumento[2,8], probablemente en relación con un incremento de la población inmunosuprimida, la mejoría de las herramientas diagnosticas y el uso generalizado de agentes antifúngicos[2,8-10].

Clínicamente, la infección por este tipo de hongos se caracteriza por la aparición de zonas de infarto y necrosis en los tejidos del huésped, debido a la invasión de la vasculatura por las hifas[6]. Hay varias formas de presentación clínica; rino-órbito-cerebral (la más frecuente, típica de pacientes diabéticos), cutánea, pulmonar, diseminada y gastrointestinal.

En cuanto al manejo, se recomienda una combinación de tratamiento quirúrgico, con desbridamiento y amputación de los segmentos afectados, y tratamiento médico. La trombosis vascular producida por los hongos y la consiguiente necrosis tisular pueden dificultar la penetración de los agentes antifúngicos en el lugar de la infección. De ahí la importancia de un desbridamiento quirúrgico agresivo.

A pesar de que la extensión de la cirugía, así como el momento de su realización, no están claramente definidos, en la literatura existen estudios que demuestran la importancia del tratamiento quirúrgico precoz para conseguir un resultado favorable[2,6,7].

En general, este tipo de hongos se caracterizan por su gran resistencia frente a los diferentes fármacos antifúngicos, recomendándose como tratamiento inicial un polieno.

Por lo tanto, el tratamiento de primera línea de elección sería la anfotericina B liposomal a altas dosis (5-7,5 mg/kg/día), aunque también se ha demostrado en diferentes series la eficacia del posaconazol, que podría ser utilizado como un tratamiento de segunda línea.

De la misma manera, existen estudios que han demostrado la eficacia de la combinación de polienos con equinocandinas, así como de la utilización de quelantes del hierro, basándose en el hecho de que hongos como el Rhizopus oryzae precisan de hierro para su crecimiento y patogénesis[1,6].

Clásicamente, y sobre la base de casos aislados, se ha incluido el traumatismo grave como factor de riesgo de la mucormicosis, debido fundamentalmente a la pérdida de sustancia de las lesiones y a la inmunosupresión secundaria a la propia enfermedad traumática, o a las medidas de soporte empleadas en ella[1-3,5-7,10]. Sin embargo, no existen estudios que sean capaces de demostrar dicha asociación.

En esta revisión, se presentan 6 casos de pacientes ingresados en el hospital como consecuencia de un traumatismo severo, definido por un ISS superior a 16. Concretamente, se trata de 6 varones de mediana edad, sin antecedentes patológicos llamativos, ni factores de riesgo asociados clásicamente con la mucormicosis, con ISS muy elevados (por encima de 30) y que precisan de ingresos prolongados en la unidad de cuidados intensivos.

Destacan los 4 primeros casos, en los que, debido a su mecanismo lesional, presentan importantes lesiones de partes blandas; ingresan en situación de shock, con coagulopatía asociada, precisando por ello de grandes dosis de hemoderivados, tratamiento corticoideo y medidas de soporte respiratorio y renal de manera prolongada. Es precisamente en esas lesiones de partes blandas donde se produce el crecimiento de los hongos.

Esta asociación se puede explicar por la inmunosupresión relacionada con el traumatismo, influida, además, por la necesidad de tratamiento corticoideo, politransfusión de hemoderivados y terapias de soporte prolongado.

Es fundamental en estos pacientes realizar un diagnóstico precoz y un tratamiento adecuado y agresivo, basado en la combinación de fármacos antifúngicos y cirugía.