Obstetrical and Pediatric Anesthesia

Epidural anesthesia in three parturients with lumbar tattoos: a review of possible implications

[L'anesthésie épidurale chez trois parturientes portant des tatouages lombaires : une revue des implications possibles]

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Purpose: To discuss the possible ramifications of neuraxial analgesia and anesthesia in women with tattoos involving their midline lumbar area.

Clinical findings: Recently the authors have received requests for epidural anesthesia in three women with tattoos over the midline of their lumbar spine. In one patient the tattoo covered her entire back. In the other two, it was possible to locate a lumbar interspace that did not have tattoo pigment in the overlying skin. All three women received uneventful epidural analgesia.

A Medline and EMBASE search for relevant publications using the keywords: epidural, spinal, tattoos, tattooing, complications did not find any reports of complications from inserting a needle through a tattoo. As none were found, the literature on tattoos and on coring with neuraxial anesthesia was reviewed to see if neuraxial anesthesia might be problematic if the needle passed through the tattoo. Coring is a complication of neuraxial anesthesia that may lead to epidermoid tumours in the subarachnoid space. Theoretically, a pigment-containing tissue core from a tattoo could be deposited into the epidural, subdural or subarachnoid spaces, leading to later neurological complications.

Conclusions: There is no information in the literature about possible risks from inserting needles through tattoos during the performance of neuraxial anesthesia. This report discusses the possible implications.

Objectif : Examiner les ramifications possibles de l'analgésie et de l'anesthésie neuraxiales chez des femmes qui ont des tatouages dans la zone lombaire médiane.

Éléments cliniques : Récemment, les auteurs ont reçu une demande d'anesthésie épidurale pour trois femmes ayant des tatouages au milieu de la colonne lombaire. Chez l'une des patientes,

le tatouage couvrait entièrement le dos. Chez les deux autres, il a été possible de trouver un espace intercostal sans pigment de tatouage sur la peau sus-jacente. Les trois femmes ont reçu une analgésie épidurale sans incident. Lors d'une recherche dans Medline et EMBASE selon les mots clés epidural, spinal, tattoos, tattooing, complications, nous n'avons trouvé aucun article sur des complications causées par l'insertion d'une aiguille au travers d'un tatouage. Nous avons donc passé en revue la documentation sur le tatouage et sur le carottage lié à l'anesthésie neuraxiale pour vérifier si l'anesthésie neuraxiale pouvait être problématique dans le cas d'une aiguille qui perce un tatouage. Le carottage est une complication de l'anesthésie neuraxiale. Il pourrait causer des tumeurs épidermoïdes dans l'espace sous-arachnoïdien. Théoriquement, le carottage de tissu contenant du pigment de tatouage peut être déposé dans les espaces péri-dural, sous-dural ou sous-arachnoïdien et provoquer des complications neurologiques ultérieures.

Conclusion : Aucun risque possible lié à l'insertion d'aiguilles dans des tatouages pendant la réalisation de l'anesthésie neuraxiale n'a encore été documenté. Le présent article examine les implications possibles.

TATTOOING, along with body piercing, has become very popular among young people. In the past, young women tended to have tattoos placed in areas remote from their back but this is no longer true. A recent article by Jeani Reid in the Vancouver Province, titled "Tattoos for a sexy but subtle spot" highlighted tattoos in the lumbar midline area. (The Province. Sunday May 26, 2002; page A40). An example of a potentially problematic sit-

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Accepted for publication April 9, 2002.

Revision accepted September 6, 2002.

uation is given in the figure. The literature is silent on possible complications of a needle inserted through a tattoo for neuraxial blockade.

Case presentations

Recently three women at our institution, who requested epidural anesthesia for labour, were found to have tattoos on their lower backs. In one case the tattoo covered the midline from approximately T12 to S1. The tattoo was a woman viewed sideways with her arms in front of her. Pigment extended to either side of the midline for approximately 1–2 cm. Fortunately there was a pigment free area located underneath the right arm of the tattoo at the level of L2–3. The epidural was successfully sited at that location using a paramedian approach. She subsequently has received a second epidural for labour, again avoiding the tattoo.

The second woman had a tattoo that completely covered her back extending to the mid-axillary line bilaterally. There was no pigment free area. The anesthesiologist inserted the epidural through the tattoo as labour was painful and prolonged and she ultimately required a Cesarean section.

A third woman had a butterfly tattoo that was midline, extending 2 cm to each side. Fortunately, it was located over the L4–5 interspace, leaving the L2–3 and L3–4 interspaces available. The epidural was successfully inserted at L2–3.

Discussion

These cases raised the question as to whether insertion of a needle through a pigmented area might lead to subsequent problems. A Medline and EMBASE search of the English literature using the key words: spinal, epidural, tattoos, tattooing, complications did not find any reports or concerns regarding neuraxial anesthesia through tattooed areas. However, one might postulate that there could be long-term implications from depositing a pigmented tissue core in the epidural or subarachnoid space.

Coring

Hollow needles, with or without a stylet, entrap tissue fragments (cores) in their bore as they pass to deeper structures.^{1,2} Injection through these needles may then result in this entrapped tissue being deposited in the deeper site. In 1956 Choremis *et al.* reported on five children who developed iatrogenic epidermoid tumours in the epidural and subarachnoid spaces following multiple spinal injections of antibiotics.³ The authors postulated that during lumbar puncture a “core” of tissue containing epidermal elements was picked up as the nonstyletted needle passed through

FIGURE Example of a potentially problematic situation. The midline tattoo extends from the L₁ to L₄ interspaces.

the skin and was subsequently injected into the subarachnoid or epidural space. The cells of the core then grew into an epidermoid tumour.³ Since that time numerous other cases have been reported including some in adults^{4–8} and one involving spinal anesthesia in a parturient.⁸ This latter case had two lumbar punctures as a child and a third at age 33 for “diagnostic purposes”. She then had a fourth for spinal anesthesia for childbirth and subsequently developed an epidermoid tumour.

Although nonstyletted needles have been implicated in “coring”, the newer styletted spinal needles also cause coring. Campbell *et al.* microscopically examined the needle tips of 25-gauge Quincke and Whitacre needles for evidence of coring after failed attempts to identify the subarachnoid space.⁹ Tissue cores were found in 80% of the Quincke needles and 41% of the Whitacre needles. Most of the tissue was blood clot or fat. No epidermal tissue was found. In this study, the spinal needle was inserted after a small

nick had been made in the skin with a larger needle.⁹ In another study, Puolakka *et al.* microscopically examined the needle tips of 27-gauge modified Quincke, modified Sprotte and modified Whitacre needles after they had passed through a fluorescein disinfectant scrubbed back into the subarachnoid space in cadavers.¹⁰ Visible fluorescent tissue particles were seen in 27-gauge modified Quincke (56%), Sprotte (37%) and Whitacre needles (37%). Epithelial cells and muscle fibres were observed in the Quincke needles, fewer were seen in the Whitacre group and only a few epithelial cells in the Sprotte group. In a study of caudal anesthesia in children, coring occurred in 54% of needles used for caudal injection.¹¹ Epidermal tissue was found in 33% of the positive samples, fat in 67% and blood material in 26%.

Ozyurt *et al.* collected 1 mL of cerebral spinal fluid (CSF) immediately after inserting a spinal needle (22-, 25- and 27-gauge Quincke needles) into the subarachnoid space.¹² The CSF was examined for epithelial cells. The authors found benign squamous cells in the CSF from each size of needle with more present in the larger gauge needle.

Tattoos

During the tattooing process the needles penetrate the epidermis into the dermis and pigment is deposited along the entire needle tract. Only pigment that is in the dermis remains permanently. After the tattoo has healed, the pigment is engulfed by dermal macrophages and carried to regional lymphatics and perivascular lymph nodes.¹³ The pigment that remains in the loose fibrous connective tissue of the dermis gives colour to the tattoo. What are the possible implications (consequences) for the anesthesiologist? Theoretically introducing a needle through the pigmented tattoo may result in a tissue core that contains pigment. This could be injected into the epidural, subdural or subarachnoid spaces.

In the past, the pigments used for tattooing were inorganic and included titanium dioxide, cadmium sulphide, chromic oxide, cadmium selenide, red cinnabar, iron oxide and carbon.¹⁴ Although more organic pigments are being used currently neither the individual being tattooed nor the tattoo artist may know the composition of the ink.

Complications of tattoos

Various reactions have been associated with tattoos including allergic, pseudolymphoma and granulomatous or lichenoid reactions.¹⁵ Mercury ions, chromium III ions or cobalt II ions induce allergic reactions. Other reported problems associated with tattooing

include transmission of hepatitis B and C¹⁶ and localized infections at the site of the tattoo. There is a case report of a spinal epidural abscess that occurred two weeks following a tattoo on a buttock.¹⁷ Other reported complications include a superficial burn in the tattoo¹⁸ and pain in the area of the tattoo,¹⁹ both during magnetic resonance imaging scanning.

Of greater concern is a report of three patients who developed brachial plexus neuropathies with muscle atrophy.²⁰ All had tattoos adjacent to the area of atrophy. The author postulated that the tattoo induced focal chronic neuromuscular dysfunction, possibly due to an immune-mediated reaction or a toxic effect of the pigment. As chemically induced arachnoiditis can occur following epidural anesthesia with local anesthetics containing preservatives,²¹ might not a similar reaction occur from pigment?

Will nicking the skin prior to inserting an epidural or spinal needle as done by Campbell *et al.*⁹ avoid picking up tissue cores containing pigment? It would seem reasonable. Obviously the size of the nick has to be larger than the needle being inserted and should penetrate through the dermis. Whether these precautions provide adequate protection is unknown.

To date, there are no reports of complications from inserting a needle through a tattoo. This could be because they do not occur. However, the lack of reported complications could reflect the fact that in the past fewer patients (pregnant and non-pregnant) had tattoos involving the midline of their lower back. The number of patients having neuraxial anesthesia through a pigmented tattoo would have been correspondingly small. Additionally, epidermoid tumours and arachnoiditis do not occur immediately but develop over time. It may be too early to see any long-term consequences.

Conclusions

Based on the limited information available it is possible that inserting an epidural or spinal needle through a tattoo could cause long-term problems such as arachnoiditis or a neuropathy secondary to an inflammatory reaction, but we don't know. Until recently neither of the authors had seen a tattoo over the lumbar spine and this report is to draw attention to others regarding possible risks attending neuraxial anesthesia with these women.

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