



Something to ponder

Another Point of View

The other day I was reading *Newsweek* magazine and came across some poll data reporting that 67 percent of Americans are unhappy with the direction the country is headed. David Letterman of talk-show fame, questioned the findings of this poll by presenting a litany of observations which certainly challenged its merits. Well, this got me thinking about the current view espoused by the anesthesia community that advocates the use of small gauge, pencil point needles (a.k.a. atraumatic needles) because they lead to a lesser chance of post dural puncture headache. And the anesthesia literature is replete with many review articles and prospective studies which sway readers to this view point. Yet when I see articles published in well established professional journals that cite the incidence of headache following dural puncture with 22 gauge Quincke needles as 33%, I can't help feel that there is some politicizing going on. Such an average, in my estimation, is untenable unless the researchers were intentionally pithing the brains of their subjects.

So what I have attempted to do here is to briefly organize a selection of studies in such a way that provides a different prospective on the reported incidences of headaches resulting from the use of various types and sizes of spinal needles. And I have chosen to look primarily (although not completely) at the pregnant population since the incidence of headache following spinal anesthesia tends to be higher in the young, female and pregnant populations.

Does Size Matter?

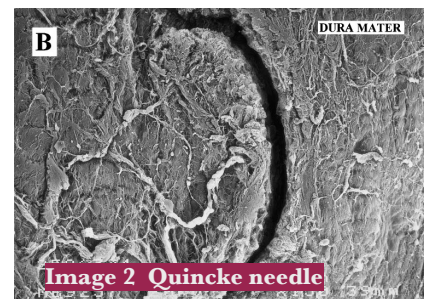
According to my wife it does, but that's a whole different issue. But in the realm of spinal needles used to provide neuroaxial anesthesia, I think the jury is still out. Take for example this prospective observational study by Landau and colleagues involving 478 consecutive women receiving CSE analgesia, who found the incidence of post-dural puncture headache to be 4% when 25-gauge Whitacre needles were used (1). And similarly a meta-analysis conducted by Peter and colleagues found that the calculated pooled estimates for the frequencies of PDPH dropped to 2.2% for the same type and gauge needle. (2) And Hwang(3), too, found relatively little difference in the incidence of headache with a reported incidence of 3.65% when 25G spinal needles were used. Pretty impressive results, I would say. And certainly one is apt to believe, at least from these studies, that smaller is better. But there is an old adage that cautions us that in many cases, the enemy of "good" is "better", and when it comes to the use of smaller gauge spinal needles this may actually be true. The incidence of PDPH may actually increase when smaller gauge spinal needles are employed. In fact, a randomized, double-blind study involving 681 parturients who had received neuroaxial anesthesia using 24 and 25 gauge needles for cesarean section reported the PDPH rate at 11.1%. (4) while the incidence of PDPH ranged from 4.5% all the way up to 9.3 % when 27 gauge spinal needles were used (5,6) And while Divcic et al(7) showed the incidence of PDPH to be 4.2 % when 24 gauge spinal needles were used in their population of 96 parturients a similar population of parturients experienced a 4% rate of PDPH when 22 gauge needles were used (8). And here's the kicker: in the former study Sprotte needles were used whereas in the latter, Quincke needles were employed. Which, of course, brings us to the discussion of whether the type of needle really makes a difference.



What Type Are You?

A lot has been touted about the merits of using pencil point needles because they are “atraumatic” and by this virtue alone, the occurrence of PDPH should be dramatically reduced. Well, I guess I don’t know what constitutes atraumatic because scanning electron microscopy (9) of the dural lesions produced by 25 gauge Quincke and Whitacre needles tells a different story. Whitacre and other pencil point needles actually produce traumatic lesions to the dural

membrane, as seen in **Image 1**. Here large tears can be seen on the borders of the orifices made by these needles. In contrast, the borders of the lesions produced by Quincke needles appear smooth and clear-cut (**Image 2**). So obviously it is not the fact that a pencil point needle is less traumatic that ostensibly produces a lower incidence of headache. Not so, say the advocates of pencil point needles. They quickly rationalize that the severe morphology of the lesions caused by these needles produces a more edematous reaction, a sort of “edematous plug” which reduces the loss of csf and hence lowers the rate of PDPH. This, of course, assumes that PDPH is a result of the loss of csf. An assumption, by the way, that is difficult to actually verify. Researchers from Albuquerque, New Mexico (10) who using T2 weighted magnetic resonance imaging of the lumbar spine some 8 to 36 hours post lumbar dural puncture in 11 patients found that CSF leakage in the paraspinous area ranged from less than 10 ml to greater than 110 ml. What they did not find was a correlation between the volume of CSF loss and the incidence of headache. Nor has there been found a correlation between the opening subarachnoid pressure and the occurrence of headache. A classic study by Marshal (11) found the subarachnoid pressures of the 6 patients who developed headache ranged from 0 to 130 mm H₂O, while the subarachnoid pressures of the 9 patients who did not have headache ranged from 0 to 50 mm H₂O. And a group from Spain(12) found no benefit using 20 gauge atraumatic needles over similar size cutting needles when performing diagnostic lumbar punctures. While this study may not be relevant to the current practice of anesthesia, considering the size of the needles used, other investigators(13,14) also have found no reduction in PDPH after diagnostic lumbar puncture when atraumatic 22-gauge needles were compared with cutting Quincke needles.



So what the heck is going on? Why do we find such wide variation in study results? Well, I imagine that there are as many explanations as there are studies, but since this is my treatise, here is my opinion. If we assume that PDPH headache is related to the loss of CSF volume, then I submit that the rate of CSF leak is influenced more by other factors than just the size or design of the spinal needle. When we consider that the dura is actually “V” shaped (with point of the “V” directed dorsally towards the midline) and its fiber orientation dispersed randomly rather than parallel (15,16,17) then it intuitively makes sense that the size of the needle hole and CSF loss is more related to the angle of approach to the dura than to the actual size of the needle. A study which examined this issue of needle bevel orientation to the dura established that when Quincke needles were placed midline all holes (entry and exit) were of similar size and type, regardless of bevel orientation relative to the cylinder axis. The holes that were produced were described as of “tin lid” in shape, and, like a tin lid, the tissue flap moved in and out of the hole depending on the direction of pressure flow. However, when the needle bevel was held parallel to the cylinder axis (lateral orientation) and inserted at near tangential angles to the penetrated surface, there consistently resulted a flap, which overlapped the margins of either the entry or the exit perforation. In other words, holes of this sort were self sealing.

What this means in practical terms is that to effectively reduce the rate of CSF loss and possibly the incidence of PDPH, the puncture of the dura should be performed tangential to the midline, i.e. using a paramedian approach or if a midline approach is taken then the bevel of the needle should face laterally to the long axis of the dura. In this way, the very dense intraspinal ligaments will then encourage the needle to deviate away slightly from the midline and enter the dural at a near tangential angle (18).

In my opinion, then, the issue of whether to ascribe PDPH to the size or type of spinal needle is sort of like the parable of the [blind men describing an elephant](#). In the case of spinal needles and PDPH, it seems that the researchers tend to understand only a tiny portion of this reality but yet ascribe to it all manner of dogmas with each researcher claiming that his version of the problem is more correct.

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