What are the different techniques to aspirate marrow using a legacy needle and what can I expect for cfu-f mL using such techniques?

We are aware of four different protocols documented in the literature to aspirate greater than 1mL of bone marrow per puncture using a legacy needle. Legacy needle is defined as a standard open-ended trocar with side ports and a removable stylet. The techniques and the corresponding reported average number of cfu-f per mL is described below:

1) Insert the needle and begin to aspirate from a single location
   (cfu-f 376 per mL; volume 10 ml : cfu-f 95 per mL ; volume 50 mL)
2) Insert the needle further into the bone space and aspirate marrow in different locations as you retract the needle from the marrow space
   (cfu-f 356 per mL; volume 8 mL : cfu-f 52 per mL; volume 30 mL)
3) Aspirate marrow using a standard BD 30mL syringe in different locations as you advance the needle into the marrow space by inserting the blunt stylet to advance the trocar to each new depth from which aspirate is taken
   (cfu-f 54 per mL; volume 30 mL)
4) Aspirate marrow using a vacuum assisted (vac-lok merit medical) 30mL syringe in different locations as you advance the needle into the marrow space by inserting the blunt stylet for each new depth from which aspirate is taken
   (cfu-f 205 per mL; volume 30 mL)

Of course, drawing 1mL always gave by far the most cfu-f per mL. (Between 1,500 - 2,000 cfu-f per mL) Each additional unit of volume taken from the initial location became significantly contaminated with peripheral blood.

For volumes of aspirate greater than 1 mL, there was no benefit to moving the needle forward or backward or leaving it in one place. Sequentially larger volumes of aspirate were always associated with greater peripheral blood contamination. A benefit was achieved by controlling the amount of negative pressure through use of a vac-lok syringe at each staged location for the aspirate as the needle was advanced.

Technique 1 and 2 used a 10 mL syringe to aspirate 8-10mL of marrow, with the corresponding mean cfu-f counts being 376 and 356 per mL, respectively. Employing technique 1 and using a 50mL syringe to increase the negative pressure while drawing the 10 mL reduces the cfu-f mL to 180 mL. Employing technique 1 using a 50 mL syringe and increasing the aspirate volume to 50 mL from a single location reduces the cfu-f mL to 95. Employing technique number 2 to aspirate 30 mL with a standard 30 mL syringe produced 52 cfu-f mL. Employing technique 3 to aspirate 30 mL of aspirate using a standard 30 mL syringe resulted in 54 cfu-f per mL. Finally, employing technique 4 to aspirate 30 mL using a vacuum assisted syringe to control the negative pressure at each 5 mL stage as the needle is advanced resulted in 205 cfu-f per mL.

The results above demonstrate the effect of peripheral blood contamination associated with larger aspirations of marrow; specifically lower cfu-f per mL. The results outlined above are consistent with the body of scientific literature developed over the last 30 years supporting the use of marrow for pathology and oncology purposes.

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