

Therapeutic Ultrasound for the treatment of apomorphine nodules

Infused apomorphine – used in the treatment of Parkinson’s Disease – can cause formation of nodules and general hardening of tissue at the sites of administration, usually the lower abdomen or upper thigh. These tissue changes may make insertion of the infusion needle difficult, and may affect absorption of the drug. There are reports of the nodules being successfully treated with therapeutic ultrasound (US), but as yet there are no evidence-based guidelines for the optimal frequency or treatment duration. We have two sources of information for the guidance we give: anecdotal evidence from clinicians who have used ultrasound to treat nodules; and the findings of a pilot clinical trial we have conducted.

Anecdotal evidence

Typically clinicians are using the following parameters: for new nodules (often tender), 3MHz, 0.2 or 0.3 W/cm², duty cycle 1:4 applied for 5 minutes per treatment head area to be covered. For chronic nodules (longer-standing and not irritable), parameters used are 3MHz, 0.5 - 0.8 W/cm² continuous for 1 minute per treatment head area.

Treatment duration is usually twice weekly for 4 - 6 weeks and then a 'rest period' of several weeks until the nodules become problematic again. Clearly there is an issue of resource allocation here. One therapy service obtained a grant for a small ultrasound machine and made a long-term loan of it to a patient with nodules so they could be treated at home as needed. Whether there are any long-term detrimental effects of doing the treatment week after week has not been established, though there is no evidence to suggest any risks. A sports therapist who has been treating his wife's nodules with ultrasound successfully for more than 10 years told us he treats as soon as there is any sign of formation with 3MHz, 1:4, 0.5 - 0.8 W/cm², 4-5 minutes over the affected area. He finds that, if caught early, the nodules only need one or two treatments. He also used low frequency US and says both frequencies are effective.

Massage appears to be helpful in some cases - fairly deep pressure is used, sometimes with a hand-held massage machine. The other very important issue is strict hygiene when inserting and changing the infusion needle. This may slip when infusions are changed daily or more often, but infection can exacerbate the trauma already present in the tissue and make life even more difficult.

Clinical trial evidence

We have completed a small placebo control trial using ultrasound to treat long-standing nodules in 12 people affected by them. Our parameters were 3MHz, 0.5 W/cm², continuous, 1 minute per treatment head, with twice-weekly treatment for 4 weeks. Treatment was applied to an area of well-established nodules, which participants said they would normally avoid for needle-siting. To gauge treatment effectiveness, we measured tissue hardness and tenderness, imaged the treated area using diagnostic ultrasound, and asked participants to say whether they would use the site for infusion after treatment. The results were mixed. We could not detect a significant difference in hardness and tenderness, although this may have been due to the small sample size in the pilot or practical problems using the assessment tools. Diagnostic ultrasound, on the other hand, did suggest that treatment improved tissue quality. Perhaps most significantly, 5/6 of the treatment group but only 1/6 of the placebo group said they would inject into the treated area. However 2/6 of each group also said they would inject into a comparable area that had not been treated, which suggests

that there was also some spontaneous healing. It may be that some presentations are more responsive to ultrasound treatment than others, although the sample size of this trial meant that sub-group analysis to investigate this possibility was not viable. It may also be that ultrasound at different parameters or at an earlier stage in nodule formation would be more effective.

Whilst a larger trial is required to build on these results, we think that there is sufficient evidence here to suggest that ultrasound may indeed be of benefit in the treatment of nodules and hardened tissue caused by apomorphine infusions.

On the basis of the trial evidence and the information that has been provided by clinicians, our suggested guidelines for therapeutic ultrasound parameters are:

Newly-formed nodules – may be tender to touch

3MHz, 0.2 - 0.3 W/cm², duty cycle 1:4 (20%), applied for 5 minutes per treatment head area to be covered. Applied twice weekly or more often until resolved, but may not need many treatments.

Longer standing nodules and hardened tissue – less likely to be tender

3MHz, 0.5 - 0.8 W/cm², continuous, applied for one minute per treatment head area to be covered. Applied twice weekly for 4 weeks, or less if resolved.

Outcomes sought are reduced tenderness and softening of the tissue sufficient to allow an infusion needle to be sited.

Caution

It must be stressed that these guidelines must be interpreted within the context of a full assessment of the patient by a trained clinician. Treatment decisions are the responsibility of the clinician.

Research Team

Leon Poltawski, Amy Todd, Hazel Edwards, Tim Watson

School of Health & Emergency Professions
University of Hertfordshire

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