

Neither Positive Nor Negative Aspiration Before Filler Injection Should Be Relied Upon as a Safety Maneuver

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We have read with interest the article by Tseng et al on a retrospective personal survey of positive aspiration.¹ However, we are unable to understand what message this article is trying to convey. It is a truly impressive testament to accurate record-keeping and analysis and is instructive in a number of areas. The incidence of positive aspirations from the seemingly safe supraperiosteal plane is sobering. It would tend to suggest that relying purely on depth of injection as a safety measure is inadequate. Interestingly, the article states no adverse vascular events were noted in patients with a positive aspiration. The article, however, makes no mention as to whether any adverse vascular events occurred in patients with negative aspiration treated by the author over the study period. This is important, for others have reported vascular accidents despite negative aspiration.²

The background presented in the abstract justifiably states that in vitro testing has known issues with false negative aspirations. The article expands on this, citing vessel collapse, a through and through phenomenon, and an inability to clear the filler when aspirating as all causing false negative results. This is indeed correct with many articles attesting to this false negative result utilizing many different filler materials.^{3–6} However, the corollary of this, a positive aspiration, should not equate to the belief in or use of aspiration as a safety maneuver. As members of a consensus group on visual loss with fillers, we believe no

evidence currently exists in the literature for aspiration as a concept or safety measure.⁷ The fact that you can elicit a positive aspiration does not justify the attempt at aspiration in the first place. Because one cannot rely on a negative aspiration, we should be directing cessation of the practice of aspiration as a safety measure.

Let us examine negative aspiration beliefs before returning to the problem of considering belief in the validity of positive aspiration as represented by this article. The facts agreed on at this stage are:

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1. Practitioners agree that the single event we are trying to avoid is a substantial intravascular occlusion of a vessel with filler resulting in an ischemic event that may lead to local ulceration or, at worst, blindness or a cerebrovascular accident. There is a belief that this may be prevented by the process of aspiration, even though there is currently NO evidence that such a practice does confer any such protection.⁷ The single reference cited in this article favoring negative aspiration as a safety maneuver is a cadaver study on needles vs cannulas, not a study in the veracity of aspiration.⁸
2. A negative aspiration (no blood seen on withdrawal of the plunger) may occur because the needle tip is not in a vessel (true negative) but can also occur if the needle tip is in a vessel but—due to the physics of flow or vessel collapse—blood will not pass back up into the syringe (false negative).
3. The concept that a negative aspiration is protective also relies on the belief that the tip of the needle or cannula is stationary from the initiation of aspiration to the completion of the injection, or stationary enough that any movement will not affect the subsequent placement of filler.
4. Prior *in vitro* studies have shown high rates of false negative aspiration, and although this paper presents an impressive number of positive aspirations, it still is not able to tell us about the number of false negatives in the same cohort. The authors have acknowledged this as a weakness in their discussion because it would seem impossible for the authors to believe that the other (minimum) 22,000 or (maximum) 574,000 attempts at aspiration were never in a vessel.
5. The article cites safety recommendations, including low-pressure injections, utilization of a small bolus per pass, and safer anatomic injection plane selection. These are laudable, but small-volume bolus and stationary positioning for injection to allow for aspiration and injection are difficult twin concepts to reconcile.

The article by Drs Tseng et al suggests that *in vitro* tests are not as useful as *in vivo* testing. However, if anything, they are possibly more useful because they are intended to exaggerate the likelihood of a positive aspiration. Yet still, they are unable to reliably produce a positive result. *In vitro* tests are not complicated by shifting hand positions or the injector, patient movement, collapsing vessels, vasospasm, intramural injections, or other vagaries of small facial vasculature but are experiments with high-pressure bags simulating arterial blood pressure, rabbit ear arteries, and containers of colored fluids. Yet paper after paper has suggested that aspiration is not reliable.³⁻⁶

The central issue with the concept of aspiration is that it implies that aspiration is a practice in safety. To date there

is no evidence to support this notion. A positive aspiration makes the injector believe in the bona fides of the process. A positive aspiration would appear a vindication of why you are aspirating. But is this feeling justifiable? No, on available evidence it is not. One cannot have doubts about the utility and confidence in negative aspiration and yet feel justified to simply move position when one finds a positive aspiration. The injector is simply moving on from one area of perceived trouble (the positive aspiration) to another area, shifting to the known risk of a false negative aspiration at the next injection point. The issue is not resolved by a positive aspiration; it is only transferred.

Given the small size of facial vessels, there is also a high likelihood that one is not in the same position at the end of the aspiration process as one was at the beginning, presenting the conundrum of having had a negative aspiration but then having moved into a vessel at the end of this maneuver. Moreover, once extrusion of filler is initiated, being confident that the needle tip has remained static between syringe pullback and initiation of injection, which often requires a change of syringe grip, would be a challenge even in the steadiest of hands.

By advocating aspiration as a principle at all, one is also denying the practitioner the ability to move the needle, which we believe is an important protective tactic. Movement, even minute, means that if the tip of the needle is in a vessel it will be out of the vessel again before much of an intravascular bolus is delivered. If one believes in aspiration, all other concepts and techniques such as antegrade and retrograde injection, fanning, ferning, and linear threading are no longer acceptable because they rely on needle movement. It would also seem difficult to apply an aspiration principle to certain areas such as injecting lips.

The authors state that 82.2% of the 175 positive aspirations occurred with primed needles and 17.8% occurred with unprimed needles. These were similar groups when matched for depth of injection. We would like to make a couple of points here. First, although more commonly seen in this study with primed needles, positive aspiration can occur with either method. We do not, however, know what proportion of aspiration attempts occurred with primed vs unprimed needles, so it is not possible to determine which option is more likely to achieve a positive aspiration.

Second, a belief in aspiration with unprimed needles requires the operator to aspirate once, deliver the injection, and then remove and replace the needle after each and every injection. Otherwise, subsequent aspirations would have a needle primed after initial bolus delivery. As the paper estimates, this could involve as many as 574,000 aspirations, and the same number of single-use needles would have to be utilized if one believes in employing unprimed needle aspiration. This

would clearly appear impractical even for those who believe aspiration is valid.

We are also unclear how the 2-second aspiration was delineated in this study. The authors state that 100% of their positive aspirations were achieved within 2 seconds or immediately, but it appears that these 2 seconds may have been the maximum aspiration time utilized. It would seem likely that a longer aspiration time if utilized would attain a higher number of positives, and the conclusion that 2 seconds is the standard time optimal would appear rather spurious. Prolonged aspiration times in other studies in vitro has indicated a greater yield with these longer aspiration times.³⁻⁵ This is not to indicate that we support any aspiration time or the act of aspiration at all.

In summary, we believe that readers of the article by Tseng et al may be falsely led to believe in the utilization of aspiration as a safety measure for the prevention of intravascular injection and its serious sequelae. Given that the current evidence shows there are false negative findings with aspiration, we feel that injectors should instead be advised to avoid risky techniques of stationary injection of large boluses and adopt the protective measures of constant needle movement, low extrusion pressure, micro boluses, larger cannulas, and optimized anatomical knowledge.

The authors of this letter believe that one should always assume one is either in or going into a vessel (as indicated by the bruising so commonly experienced during injection sessions). If a vessel is entered, the aim of these protective techniques is to minimize the risk of any intravascular deposit and—if it does occur (inevitable, we feel)—restrict it to an exceedingly small quantity that can disperse in the circulation without leading to catastrophic consequences. We are not saying other methods are risk free. What we are saying is aspiration cannot be relied on at all (positive or negative), so other measures must be employed to minimize risk.

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