Cosmetic Medicine

Commentary on: Internal and External Carotid Artery Embolism Following Facial Injection of Autologous Fat

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The author wishes to thank Wang et al1 for publishing this Case Report. It is vitally important that rare and unusual outcomes be published and discussed, not only to raise awareness of the risk of severe adverse events but also to serve as a means to illustrate the techniques prescribed to prevent them in the first place. The operating surgeon is reported to have followed most of the known standard operating procedures in terms of risk reduction. Unfortunately, the original surgeon is not one of the authors of this report, raising some concern whether any important details have been lost in transfer. Wang et al have thoroughly investigated the patient for signs of anatomic predisposing factors but did not find anything of note. In particular, there were no signs of preexisting scarring in the regions grafted, no abnormal vessels or vascular malformations in the grafted sites, and no signs of abnormal venous to arterial pathways that might explain graft material entering the arterial circulation from the venous side. Also, there were apparently no abnormal hemodynamic signs discovered during surgery, nor were there any cutaneous signs of ischemia noted either during the operation or soon thereafter. Unfortunately, there are no photos available of the patient’s appearance, so we cannot judge whether bruising or other issues obscured the diagnosis.

Could this adverse event have been prevented? The known risk reduction strategies used in this case included preaspiration, minimizing bolus size injected, using blunt cannulae, and avoiding treatment of scarred areas.2–5 Reviewing the literature, many types of embolic complications have been reported in association with autologous fat transfer,6–7 including stroke8 and even fatal cerebral embolism.9 The type of fat embolism in this case is fundamentally different from the common forms of fat embolism related to extensive liposuction directly, or the forms of fat embolism resulting from long bone fractures or orthopedic procedures.10–14 This case was almost certainly a result of the intra-arterial embolism of grafted fat, resulting in obstruction of arterial blood supply, rather than the former (venous) types. Any particulate material (steroid medications, collagen, paraffin, silicone oils, polymethyl methacrylate, calcium hydroxylapatite, etc)3,15–18 injected into the body has the potential to embolize through intra-arterial pathways, particularly when sharp needles are used for injection.2 Blindness has been reported as a complication of autologous fat grafting,3,5,8,19–30 as well as other fillers15–17,20,21,31–36 (or indeed even as a result of other kinds of perioperative events37). Unfortunately, no safe and reliable treatment yet exists for reversal of iatrogenic opthalmic artery embolism.3

The nose and the nasolabial fold areas are at highest risk of skin necrosis, and blindness has been most often associated with injection of the glabella,16 consistent with the findings in this case. In this patient, fat was supposedly injected utilizing a small bolus technique with 1-mL syringes, using a blunt cannula. It has been suggested that cannulas reduce but do not eliminate the risk of injection4 and that small bolus volumes (less than 0.1 mL per pass) are less likely to fill the arterial columns retrograde back to the central retinal artery.2 Despite these reports, there have not been any experimental studies to conclusively prove the risk reduction of cannula use. The risk reduction has been deduced from the greater number of case reports in the literature when sharp needles have been used rather than blunt cannulae, but remember that the data are confounded by different rates of clinical use between these. In this case, it is not clear if any epinephrine-containing solution was injected into the recipient sites (this reduces risk by reducing the vessel diameters).2,4 From the surgical

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report, as it stands, one can find no other surgical actions or omissions that caused or contributed to the adverse event, apart from the latter.

The estimated incidence of a severe complication resulting from a filler injection has been estimated as 0.0001%, or 1 in a million. To put this into some familiar context, the risk of permanent blindness from blepharoplasty has been reported as 0.0033%, or 1 in 30,000, and, in another report, the incidence of orbital hemorrhage associated with permanent blindness at 0.0045%, or 1 in 22,000.

Unfortunately, these events are probably fundamentally unavoidable beyond some limit, even with maximal regard to preaspiration, careful site preparation with epinephrine, and low pressure, low-volume bolus injection per pass, blunt cannulas, and other strategies used to decrease risk. Some surgeons may even go so far as to map out the location of vessels using ultrasound or other technologies prior to injection. In the end, with increasing numbers of patients being treated, the prevalence of this problem is likely to go up over time, if nothing else, because of the statistical certainties involved (ie, increasing numbers of patients undergoing treatment). However, we must put the risks into perspective because they have been depressingly poor, prevention is key.

**SUMMARY**

Unfortunately, this author can think of no intervention or alteration of treatment method that would have improved this patient’s outcome (apart from the use of epinephrine in the treatment areas prior to injection). Once this patient had arrived in the recovery area, the damage was already done. With these rare complications, there is always a great danger of hubris. Just as any experienced surgeon will tell you, if a procedure actually accomplishes something, there will be some nonzero risk of adverse events. We cannot have completely risk-free procedures, although it is a very good thing that we all aspire to that noble goal. The best we can hope for is to make that number as small as possible by practicing as safely and ethically as possible.

**Disclosures**

The author is a medical director, paid consultant, and member of the speakers bureaus for MERZ Pharma Canada Inc (Burlington, Ontario), Allergan Canada Inc (Markham, Ontario), Medicis Aesthetics Canada Ltd (Toronto, Ontario), Ethicon Endo-Surgery Inc (Cincinnati, Ohio), Baxter International (Deerfield, Illinois), Valeant Pharmaceuticals North America LLC (Bridgewater, New Jersey), and Kythera Biopharmaceuticals (Calabasas, California).

**REFERENCES**