Expert's comment concerning Grand Rounds case entitled “The routine intra-operative use of pulse oximetry for monitoring can prevent severe thromboembolic complications in anterior surgery” (by M.A. König, Y. Leung, S. Jürgens, S. MacSweeney and B.M. Boszczyk)

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Abstract Routine monitoring of left extremity circulation with pulse oximetry during anterior lumbar surgery may help diagnose left iliac artery thrombosis and will lead to quick treatment of this potentially catastrophic complication.

Keywords Pulse oximetry in anterior lumbar surgery · Preventing thrombotic complications in anterior lumbar surgery · Left iliac artery occlusion during L4–5 anterior fusion

Congratulations to Dr. König and his colleagues for a wonderful illustration of the value of pulse oximetry in detecting left iliac artery thrombosis during anterior lumbar surgery. Since the publication of our study in 2003 [1], it has been our practice to use the pulse oximeter on one of the toes of the left foot as a sensitive yet inexpensive way

to monitor the arterial flow to the left lower extremity. Not only has this maneuver helped us with the early detection of left iliac artery thrombosis, but it has also helped to reduce the incidence of this potentially tragic complication from 0.8% in our first 686 cases [2] to less than 0.1% in our last 2,300 cases. First of all, we mobilize the iliac artery as distally as possible to reduce the stretch on it when the retractors are placed at L4–5 and then we try to avoid complete occlusion of this vessel deploying the retractors so as to keep the saturation from falling. If we cannot avoid occlusion and the saturation drops to 0 we then give the spine surgeon 45 min to complete the procedure. At the end of this period, if the spine surgeon needs more time, we release the retractors and allow several cardiac cycles for the saturation to return to baseline values then re-apply the retractors for another 30 min. Our longest time of occlusion is 54 min without any thrombotic complications.

Our more recent recommendations for management when the O₂ saturation does not return to the pre-operative level, which is usually 100% or to at least 95%, are that this is enough reason to carry out investigations in the operating room (OR), including intra-operative angiography, to confirm the diagnosis of left iliac artery occlusion. The patient should not leave the OR to go to an angiography unit for diagnostic purposes. This will only delay the diagnosis and expose the patient to possible compartment syndrome post re-perfusion. We recommend that nothing be done post re-perfusion in patients with 0–2 h of ischemia, careful monitoring including serial compartment pressure measurements when there are 2–4 h of ischemia and prophylactic fasciotomies when ischemia exceeds 4 h.

In patients undergoing disc replacement or fusion with a stand-alone device requiring divergent screws, where there are calcium deposits in the vessel walls, exposure at L4–5 may be more dangerous because of the possibility of

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fracturing a calcified plaque. The surgeon must exercise careful judgment while performing the approach and if the vessels do not yield enough without risk of arterial wall damage then a device that can be placed more antero-laterally should be available for use. The patient needs to be aware of the possibility of this “plan B” when such conditions are present.

Our only recommendation regarding the present case is that the lower level (L4–5) should have been done first then the retractors released at that level and re-applied for L3–4. That way, you reduce the time of ischemia from occlusion of the iliac artery, since it is extremely unusual for the saturation to drop when L3–4 alone is exposed.

Otherwise, this case is a perfect example of how the pulse oximeter should be used to both reduce the incidence and provide early diagnosis of left iliac artery thrombosis.

References

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