

QUESTION 4: Should suction tips be regularly changed during surgery? If so, how frequently?

RECOMMENDATION: Yes. The suction tips should be regularly changed during surgery. Although no time threshold has been established for its exchange, we believe it should be changed every 60 minutes. Studies have shown that suction tips get contaminated during surgery and the contamination rate is higher with prolonged operative time.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 85%, Disagree: 9%, Abstain: 6% (Super Majority, Strong Consensus)

RATIONALE

Contamination of the suction tip during surgical procedures has been reported [1–7]. This occurs either by airborne bacteria because of the large volume of air passing through the suction tip, by direct contamination of the tip by contact with patient's skin or by improper handling by operating team members. In the orthopaedic field, several studies reported contamination rates of suction tips as high as 37 to 65% in conventional/non-laminar air operating theaters [4,6–8] and 4.6 to 41% in ultra-clean/laminar flow operating theaters [2,5]. *Staphylococcus* species (coagulase-negative and epidermidis) were the dominating contaminants isolated from suction tips, comprising 34 to 100% of cases [1,2,4–8].

Only one study, by Givissis et al., reported a patient that developed a deep wound infection with the same microorganism responsible for contaminating the suction catheter tip [4]. No other study was identified showing an association between contamination and deep or superficial infection. Furthermore, two studies showed relationships between the duration of use, and the contamination rates of suction tips. Greenough et al. [6] reported a 37% (11/30) contamination rate after a median of 82 minutes of operating time (suction usage), compared to a 3.3% (1/30) rate after a median duration of 17 minutes of suction usage. Givissis et al. [4] showed that in surgeries lasting less than 1 hour, suction tip cultures were positive only in 1 out of 11 (9.1%), compared to 26 out of 39 (66.7%) when surgery operative times exceeded 1 hour.

When analyzing studies from different surgical fields, considerably greater contamination of suction tips was also noted. Laham et al. [9] analyzed general contamination in public and private general operating rooms and observed suction tip contamination in 13.33% of cases. Larson et al. [10] evaluated suction catheter contamination during aortic valve replacement surgery and showed contamination rates from 48 to 52%. McMaster et al. [11] found a contamination rate 21% of suction tips used in Cesarean deliveries. In non-orthopaedic surgery, main contaminants isolated from suction tips were also *Staphylococcus* species (coagulase-negative) comprising up to 76% of cases [9,10].

Multiple authors recommend changing the suction tip/catheter during prolonged surgeries or before critical steps of surgery (preparing femoral canal or cementing components) and turning off the suction when it is not in use [2–7,12]. However, there are concerns that turning off the suction might impose risk of contaminations of the surgical field due to backflow of the material along the suction tube and tip. Therefore, we think that suction device should be turned on as late as possible to minimize the risk of airborne contamination. Because of the high contamination rates and plausible bacterial seeding to operating wound, use of suction tips as a probe, retractor or pointer during surgery should be actively discouraged.

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