METHODS

A standard cortical mastoidectomy was performed on 3 cadaveric temporal bones in the temporal bone laboratory (Fig. 1). Air quality was determined according to the guidelines established by The National Institute for Occupational Safety and Health using cassettes with 37-mm, 0.8-µm PVC filters. Respirable particles were collected through cyclone filtration attached to the surgeon’s lapel (Fig. 2). Concentration of total particulate was calculated through the following equation:

\[ C = \left( \frac{W_2 - W_1}{V} \right) \times 10^3, \text{mg/m}^3 \]

where \( C \) = concentration (mg/m³), \( W_2 \) = post-sampling filter weight (mg), \( W_1 \) = pre-sampling filter weight (mg), and \( V \) = volume of flow (L).

To verify the effectiveness of the surgical respirator, CPR mannequins were positioned near the surgical field to simulate health care workers (Fig. 3). Mannequins were fitted with either an N95 surgical respirator or standard surgical mask. Statistical analysis was performed using Student’s t test with statistical significance corresponding to \( P \leq 0.05 \).

RESULTS

Table 1 displays the concentration of total suspended and respirable particulate matter for each of the three trials. The average concentration of TSPM was 1.89 mg/m³ and the quantity of respirable particles was below detection levels. Table 2 shows the average concentration for the standard surgical mask was 1.66 mg/m³ compared with undetectable for the surgical respirator. The concentration of particulate exposure of the surgical respirator was significantly less (\( P = 0.028 \)) than the control group. As expected, there was no significant difference in average dust concentration between standard surgical mask and controls (\( P = 0.760 \)).

CONCLUSIONS

The concentration of bone dust produced during cortical mastoidectomy is below regulatory guidelines for use of particulate respirators. However, decreased exposure of bone dust was identified with the use of a surgical respirator in test mannequins.

REFERENCES