ABSTRACT

Forces acting during air and ground transport on patients stabilized by standard immobilization techniques.

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OBJECTIVE: Transportation, whether by air or ground, exposes the injured patient to mechanical shocks and vibrations. These forces and their hazardous potential remain largely unknown. The purpose of this study was to identify, characterize, and compare the forces generated during patient transport in helicopter and ground ambulances.

METHODS: Forces generated during transport were measured using an instrumented, low mass triaxial accelerometer fixed to a standard subject immobilized on the board during experimental ambulance and helicopter trials. Acceleration waveforms were analyzed in each mode of transport.

RESULTS: Forces for both ground and air transport ranged 0.07g to 0.19g root mean square, and 0.32g to 0.83g mean peak. The vibrational forces in the helicopter were fairly discrete, located at 6.6, more diffuse, occurring below 1 Hz and between 10 and 15 Hz. Crest factor analysis shows that shocks were more uniform in the helicopter than on the ground, especially in the anterior-posterior axis.

CONCLUSION: These data suggest that transportation by helicopter subjects supine patients to greater lateral and vertical forces, but smaller head to toe forces, than ground transportation (P less than 0.05). In general, the forces to which a backboarded subject is subjected during transport range from 0.32g to 0.83g, vary by direction, and are more predictable for air than for ground transport. The clinical significance of these measurements requires further study.

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