Abstract Despite via-ferrata (Klettersteig) climbing has become more and more popular, currently no appropriate safety equipment is available for lightweight climbers. A typical example of missing user friendliness for children is the via ferrata carabiner whose dimension -- compared to customary adult equipment -- and unlocking procedure might be inadequate for a child's hand. A new designed effort saving via-ferrata carabiner (ERGOTEC, SALEWA Sportgeräte GmbH, Germany) has been evaluated with respect to ergonomics and user friendliness for both children and adults. Twelve adults (21 to 29 years) and twelve children and adolescents (7 to 15 years) tested a new effort saving via-ferrata carabiner ERGOTEC and two conventional carabiners -- One-Touch (EDELRID GmbH & Co. KG, Germany) and ATTAC (SALEWA Sportgeräte GmbH, Germany). The activities produced by the flexors M. brachioradialis and M. flexor carpi ulnaris were measured in two loading situations by using Electromyography (EMG, Noraxon Inc., USA). With the new effort saving via-ferrata carabiner a reduction of muscle activity compared to the two conventional carabiners was observed for adults as well as for children and adolescents. However due to different hand anthropometry and muscle forces differences in operation and handling of the via-ferrata carabiners, i.e. the position of the transmission of the finger forces, were observed. To compensate the lower finger forces children use the advantage of a better lever arm for all three tested
carabiners, i.e. the distance of the force transmission to the hinge joint increased. But with this position of the fingers it is difficult to mount the customary carabiners in the steel cable. With the design of the via-ferrata carabiner ERGOTEC a user friendly handling was observed also with the anthropometry of smaller child hands.