Fig. S1. Schematic of the methodology used to collect the maximum disc attachment force (A) and stem tensile breaking force (TBF; B) values. The sea urchin was restrained by a sponge (in yellow), exposing only the body location of interest, which in the diagram is the oral side. The sea urchin inside the sponge was then placed in a PVC tube that was submerged in sea water (white bars holding the yellow sponge). The maximum attachment force of the disc (A) was assessed by attaching a capillary tube to an electric force gauge e and, once a single tube foot was attached, a constant vertical force was applied and the force (N) when the tube foot detached was recorded as the maximum attachment force for that experimental test. Stem TBF (B) was obtained by clipping a metal clip at approximately one half the length of the stem and then pulling at a constant rate until breakage (B). The breaking force was registered in N by an electric force gauge and recorded as tensile breaking force (TBF).
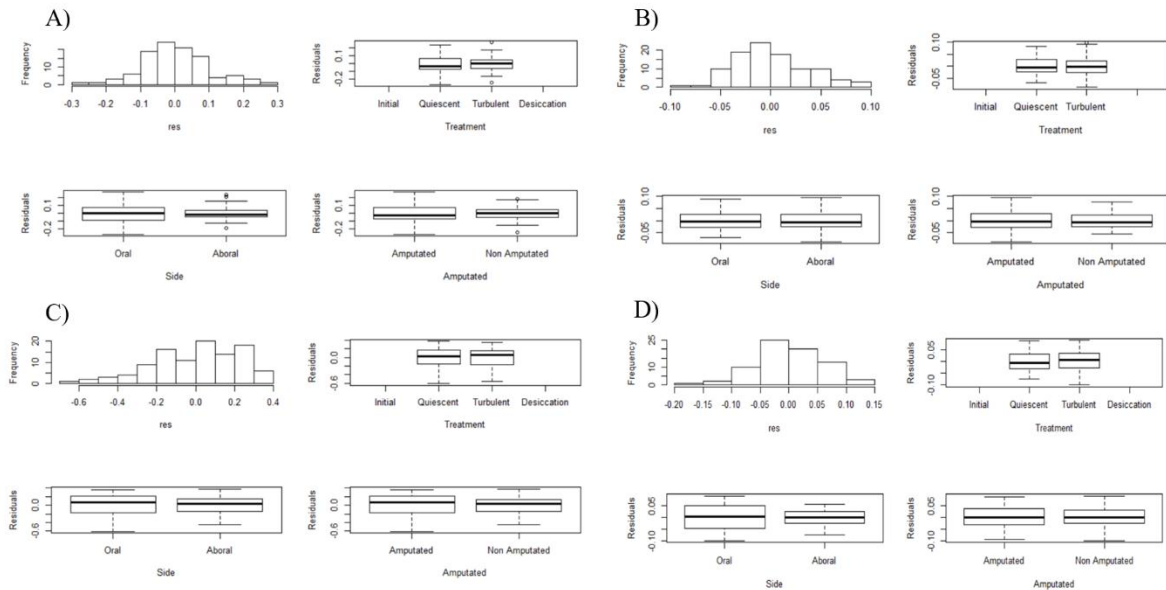
Fig. S2. Assumptions validation of the ANOVA on A) tube foot disc surface area (mm^2), B) maximum disc tenacity (MPa), C) tube feet length, and D) stem tensile breaking force to test for the effect of the factors: hydrodynamic conditions (levels: Turbulent, Quiescent), amputation (levels: Amputated, Non-amputated), and body location (levels: Oral, Aboral). The normality assumption shown is a histogram of the model residuals. The homogeneity of variance assumption is shown as a boxplot of the model residuals against the levels of each predictor factor.
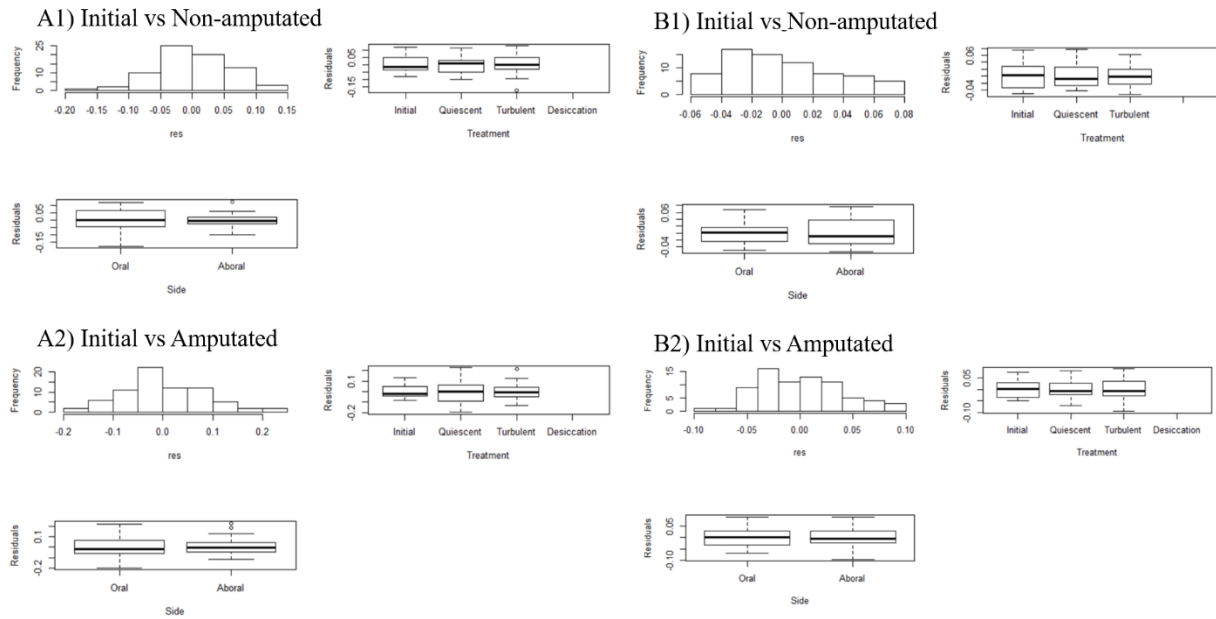
Fig. S3. Assumptions validation of the ANOVA on A) tube foot disc surface area (mm^2), and B) maximum disc tenacity (MPa) to test for the effect of the factors: treatment (levels: Initial, Turbulent, Quiescent), and body location (levels: Oral, Aboral). Analyses were conducted separately for 1) Non-amputated tube feet of Initial sea urchins vs Non-amputated tube feet of experimental sea urchins, and 2) Non-amputated tube feet of Initial sea urchins vs Amputated tube feet of experimental sea urchins. The normality assumption is shown as a histogram of the model residuals. The homogeneity of variance assumption is shown as a boxplot of the model residuals against the levels of each predictor factor.
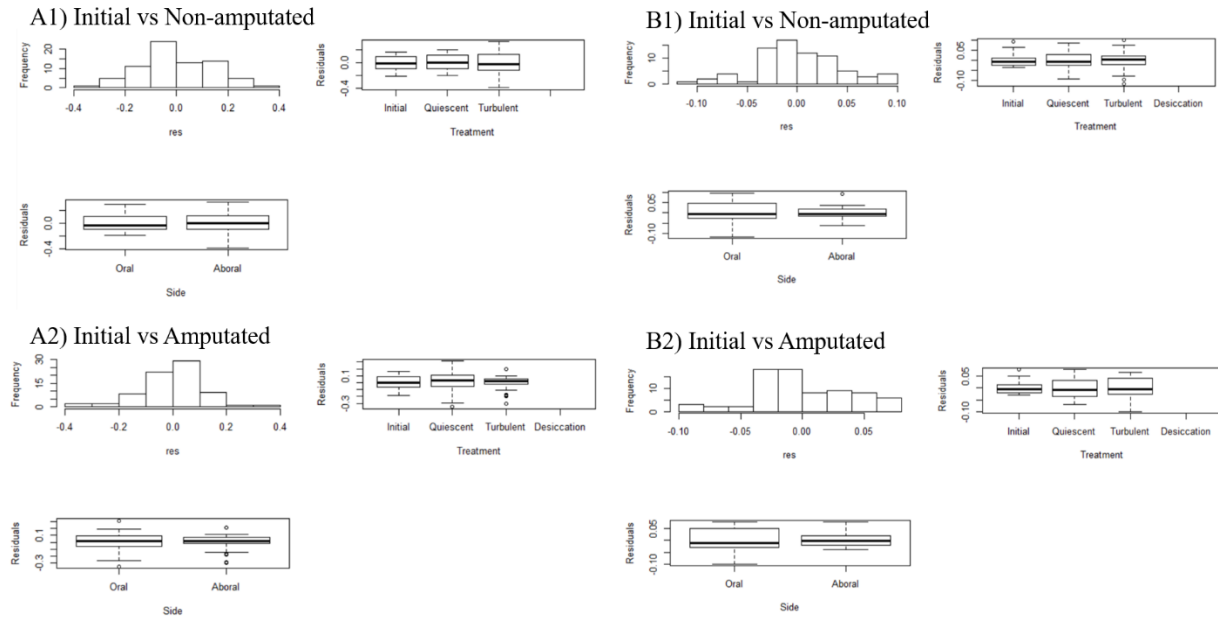
Fig. S4. Assumptions validation of the ANOVA on A) tube foot length (mm), and B) stem tensile breaking force (TBS; N) to test for the effect of the factors: treatment (levels: Initial, Turbulent, Quiescent) and body location (levels: Oral, Aboral). Analyses were conducted separately for 1) Non-amputated tube feet of Initial sea urchins vs Non-amputated tube feet of experimental sea urchins, and 2) Non-amputated tube feet of Initial sea urchins vs Amputated tube feet of experimental sea urchins. The normality assumption is shown as a histogram of the model residuals. The homogeneity of variance assumption is shown as a boxplot of the model residuals against the levels of each predictor factor.

Table S1. Mean test diameter, SD, and sample size of sea urchins used to obtain initial values (initial) and of sea urchins used in each experimental treatment.

Treatment	Diameter (mean±SD)		Sample size
Initial	37.38	±2.92	11
Quiescent	37.24	±2.71	11
Turbulent	37.59	±2.76	15
Desiccation	37.54	±2.89	13