The reason behind a sudden death of a young individual remains unknown in up to 50% of postmortem cases. Pathogenic mutations in genes encoding heart proteins are known to cause sudden cardiac death. Objective. The aim of our study was to ascertain whether genetic alterations could provide an explanation for sudden cardiac death in a juvenile cohort with no conclusive cause of death after comprehensive autopsy. Once this has been proven, analyse the familial screening and see the implication within each family.

Methods: Twenty-nine cases < 15 years showing no-conclusive cause of death after a complete autopsy were studied. Genetic analysis of 7 main genes associated with sudden cardiac death was performed using Sanger technology in low quality DNA cases, while in good quality cases the analysis of 55 genes associated with sudden cardiac death was performed using Next Generation Sequencing technology. With these results, mutations were screened through parents and first and second degree relatives and clinical decisions were taken accordingly.

Results. Thirty-five genetic variants were identified in 12 cases (41.37%). Ten genetic variants in genes encoding cardiac ion channels were identified in 8 cases (27.58%). We also identified 9 cases (31.03%) carrying 25 genetic variants in genes encoding structural cardiac proteins. Nine cases carried more than one genetic variation, 5 of them combining structural and non-structural genes. In 80% of the cases familial screening could be performed. Carriers of these mutations were identified and clinical and therapeutic decisions were taken accordingly following international guidelines for sudden death prevention (data to be finished by march 2015).

Conclusions. Our study supports the inclusion of molecular autopsy in forensic routine protocols when no conclusive cause of death is identified. Around 40% of sudden cardiac death young cases carry a genetic variant that could provide an explanation for the cause of death. Because relatives could be at risk of sudden cardiac death, our data reinforce their need of clinical assessment and, if indicated, of genetic analysis.