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LETTER TO THE EDITOR

Letter to the Editor concerning "Vertebral rotation in adolescent idiopathic scoliosis calculated by radiograph and back surface analysis-based methods: correlation between the Raimondi method and rasterstereography"

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To the Editor,

An editorial entitled 'Statistics: all together not' was published in several science journals in the beginning of 2011 year [1] as a first example of a forthcoming series of perspective articles on statistics. An article has been published in the European Spine Journal [2]. We think that supporting the feasibility of using the rasterstereographic tool Formetric 4D, both as a diagnostic tool and in scientific research, requires much more scientific exactness. Such an article does not provide enough details about the hypothesis it tries to support. The purpose of this letter is to underline what we consider to be substantial omission or error.

Several points will be addressed in this letter to explain better the state of the art about the topic described in this article [2].

- In particular, among the aims of the study there is the 'correlation' evaluation, but there is no effective comparison between the methodology object of study and the assumed golden standard. In fact, in this case, the comparison of the signals is a standard goal to achieve proper measures reliability. The error of the new Formetric 4D method should also be investigated (Bland–Altman test) [3]. In this article the error was assessed with un-appropriate statistical test "Correlation and *t* test" [4].
- The proper sample size [5] was not calculated [6].
- The experiment has not been well controlled regarding environmental conditions (i.e., laboratory temperature and humidity) and test re-test for measurement repeatability (intra-class correlation coefficient) [5].
- Few and unclear measures have been included in the results section (without unit of measures, also in Fig. 3 of Mangone et al.'s paper [2]). In particular, the ratio (Δ %) between the two methods is missing in Results (Raimondi/Formetric 4D mean data: Cobb $-30°$ 9.93/4.99 = 50 %; thoracic 9.18/5.52 = 40 %; lumbar 10.18/4.82 = 53 %; Cobb $< 30°$ 8.11/5.50 = 32 %; Cobb $\geq 30°$ 15.61/8.31 = 47 %).
- In our opinion, the large differences between the two methods found for all measures (M ± SD: 44 % ± 4 %) prompt caution in the use of the Formetric 4D. A simple correlation does not disclose such huge differences in results [4].

The authors state that the Formetric 4D is a diagnostic tool which offers the advantage of needlessly exposing the subject to ionize radiation and therefore can be performed much more frequently during both screening and follow-up [2]. We should verify the data from this study with caution before suggesting such a clear indication. Moreover, the omission of important information for a research paper pushes scoliosis specialists and researchers to investigate further this topic.

The aim of the authors to prompt the use of the Formetric 4D for both diagnostic application and scientific

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research is commendable. We are fully aware of the objective difficulty of the vertebral rotation assessment, affecting *in primis* the Raimondi method. Nevertheless, we do believe a statistically valuable Formetric 4D vs. Raimondi method comparison is essential. On the other hand, the article falls short of meeting this aim: there is no signal reliability evaluation, important methodological data are missing, the experimental conditions were not properly controlled, a proper statistics is missing, and there are imprecisions about one figure. We hope the authors will address these deficiencies in future articles.

Conflict of interest There are no conflicts of interest in this paper.

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