Ultrasound guided hydrostatic reduction of acute intussusception

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Dear Sir,

I read with interest the article titled Ultrasound Guided Hydrostatic reduction of Acute Intussusception in children by saline enema: our Experience by Debashish Nayak and S. Jagadish in the previous issue [1]. I have certain observations in the article and I want authors' explanation and comments by experts in the field.

Table 1 shows summary of findings. Age is 15.62 ± 26.07 months for all ages and 17.63 ± 28.52 months for Gr. 1 (Average $\pm$ Standard deviation. But, Standard deviation cannot be more than average). 16.62 ± 26.07 means a range of -10.45 to 42.69 months. This looks absurd as the range of the patients in the study is 17 days to 4 years and -10.45 months does not mean anything. Similar comments apply for the Gr. 1 figures also.

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Secondly, Fig. 1 shows types of intussusception in the two groups. When laparotomy was not done, these indicate types according to ultrasound findings. Is ultrasound reliable for differentiating different types of intussusception? If so, what are the findings in different types? Are there any studies which have correlated ultrasound diagnosis with operative findings to find the accuracy of ultrasound findings?

Thirdly, authors have stated under discussion that "...presence of free fluid in the abdomen indicates perforation, even if peritoneal signs are absent." We have seen many ultrasound reports showing free fluid and confirmed at laparotomy some amount of free fluid in the peritoneal cavity in cases of intestinal obstruction due excess secretion of peritoneal fluid by serosa of distended coils of intestines. There need not be perforation. So, the above statement is not correct.

References

1. Debashish Nayak, S. Jagadish: Ultrasound Guided Hydrostatic reduction of Acute Intussusception in children by saline enema: our Experience. Indian J surg 70:8–13

Author's response

Dear Sir,

I stand in receipt of Dr. Ramakrishna's letter regarding our article on hydrostatic reduction of intussusception published in February. Although it is not possible to discuss in detail statistics and sonology here, I shall try and answer the points raised to the best of my ability and the space available. Our responses to his queries follow below.

1. Mean is not the same as average

Mean is of two types; arithmetic mean and geometric mean. For scientific studies with sufficiently large study size it is customary to use geometric mean as it is more accurate, for a small study there is no difference between either mean values. Arithmetic mean is also called 'average'. All data in our study is expressed as geometric mean $\pm$ standard deviation.

2. *Standard deviation has no relationship with mean value*

Standard deviation merely depicts where the mean lies in reference to the samples themselves. It is a “property of the population and not the mean”. It depends on the positions of the first value, the mean value and the last value. In this case the first and the last values are located far apart (the youngest child was a neonate of 17 days i.e. 0.56 months while oldest child was 4 years i.e. 48 months of age) so the standard deviation is unusually large.

A large standard deviation denotes that the values being studied are dissimilar and so there is no statistical association between the values and the event viz. age has no correlation with intussusception. It follows that a small standard deviation indicates a strong etiological association and should be studied further.

The value analogous to standard deviation but which is a ‘property of mean’ and not the population is *standard error of mean*.

3. *Standard deviation need not mean something*

The reason for such a wide standard deviation and data range is already mentioned in my study (paragraph 2 of results section on page 9). The fact that this is a ‘statistical artifact’ is also mentioned along with. Apparently it remains unread.

In an ideal situation the data will be equally distributed either side of mean value forming a ‘bell-curve’, mean will be the middle value, most of the data will be within 2 standard deviations on either side of mean and the smallest value is same distance from mean as the largest value. Such is the nature of what is called ‘normally distributed’ data.

Alas, that was not meant to be the case here. This type of observed values are said to be ‘non-normally distributed’. Although the largest value is 48 months and far away from mean ($48 - 15 = 33$ months) the smallest value is relatively close by ($0.56 - 15 = 14.44$ months). This is called a ‘skew’ and because of it some data will seem out of place viz. data range predates

birth. A non-normally distributed data should not be seriously analyzed for etiological relationship. Data with skewed distribution shall not obey any statistical rules and may yield bizarre values on analysis.

Whatever the values seen we cannot but mention them truthfully in our article as they were in the study population. To do otherwise would be cheating.

4. *Ultrasound can reliably tell the type of intussusception*

Radiologists do it by two ways. He can look for certain signs which are specific for a type of intussusception e.g. frond sign is specific for ileoileocolic type, pseudo-kidney sign for colocolic. Another cruder approach is to see the geographical location of intussusception i.e. if it is located low in right paracolic gutter it is called ileo-colic. A combination of both strategies was used by us.

The accuracy varies from 56–92 % among various series as per one review [1]. There is no study in our knowledge that specifically compared USG’s findings to laparotomy findings.

5. *Free fluid abdomen is pathological* [1]

It appears that our statement has been taken quite literally. Abdominal cavity is meant to have a small amount of free fluid in it. An increase in free fluid is seen in many intra-abdominal conditions and may merely reflect peritoneal reaction. Since there is no definition of ‘usual’ amount of free fluid this lends itself open to subjective interpretation by the radiologist. What we meant by ‘free fluid’ is that the presence of free fluid abdomen was in excess of usual in the opinion of the radiologist. All available literature indicates that this predicts a very high likelihood of intestinal perforation.

Reference

1. Pendergast L, Wilson M (2003) Intussusception: A Sonographer’s Perspective. *J Diagn Med Sonography* 19(4):231