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CORRELATION OF VECTOR VOLUME PARAMETERS

Hypothesis / aims of study

Vector volume manometry gives a three dimensional view of the anal canal. The total volume of pressure can be calculated but is very large and may be difficult to interpret between patients. The average anal canal pressure and maximum anal canal pressure are easier measurements to interpret.

In this study we look at any correlation between the total vector volume, average and maximum anal canal pressures.

The anal canal radial asymmetry is also calculated in vector volume manometry. Longitudinal anal canal asymmetry can be calculated by dividing the maximum over the average anal canal pressure. This study also investigates the correlation between the radial and longitudinal anal canal symmetry.

Study design, materials and methods

24 patients with no bowel symptoms were recruited. VVM was performed using Medical Measurement Systems automated puller and a water perfused, 8 channel radially arranged catheter.

The correlation equations were then assessed for accuracy on a further 70 patients with anal pathology.

Results

The average anal canal pressure and maximum anal canal pressure, either at rest or when squeezing, were found to correlate with the volume of pressure and can be calculated by the equations in the table below.

There was a correlation between the maximum and average anal canal pressures. There was also a linear relationship between anal canal asymmetry and the maximal/average anal canal pressure. These equations are also shown in the table below.

Vector Volume= (35865 x average anal canal pressure) – 1029880   (P < 0.0001, r = 0.97)
Average anal canal pressure = (Vector Volume + 1029880) / 35865   (P < 0.0001, r = 0.89)
Maximum anal canal pressure = (1.43 x average anal canal pressure) + 44   (P < 0.0001, r = 0.93)
Asymmetry = 12.2 x $\dfrac{\text{Maximum anal canal pressure}}{\text{Average anal canal pressure}}$ - 0.49   (P < 0.0001, r = 0.75)

The equations for the vector volume correlations were then used to convert the vector volume to maximum and average anal canal pressures in patients with anal pathology. There was good agreement between the measured average and the calculated average anal canal pressure both at rest (p < 0.0001) and when squeezing (p < 0.0001). There was also good agreement between the measured maximum and the calculated maximum anal canal pressure both at rest (p < 0.0001) and when squeezing (p < 0.0001).

Interpretation of results

As the value of the maximal anal canal pressure increases in relation to the average anal canal pressure the asymmetry increases. This suggests that as radial anal canal asymmetry increases, longitudinal anal canal asymmetry increases as well.

Concluding message

The correlation seen between the vector volume, average anal canal pressure and the maximal anal canal pressure can be of benefit in producing values that are more readily interpreted by investigators.

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Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**Lewisham Ethics Committee**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**