

# Nussbaumer Aneurysm Dilation Ratio (NADR) | An Improved Method for AAA Prognosis

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## INTRODUCTION

The concern regarding the treatment of abdominal aortic aneurysms (AAAs) is whether to surgically repair the aneurysm or to monitor the rate of aneurismal growth periodically. When evaluating the risk of AAA rupture, a measurement of the maximal diameter of the aneurysm is taken into consideration. Generally, AAAs measuring greater than 5.0 centimeters (cm) in diameter are surgically repaired and smaller aneurysms, measuring less than 5.0 cm in diameter, are monitored periodically.

## PURPOSE

To emphasize that the aneurysm diameter alone does not provide adequate information about the risk of aneurismal rupture because the native aorta of each individual varies in size. The diameter of 5 cm is an arbitrary number that does not provide sufficient information pertaining to the amount of aortic dilation. The proposed Nussbaumer Aneurysm Dilation Ratio (NADR) not only includes the measurement of the maximal diameter of the aneurysm, but also the measurement of the diameter of the native, uninvolved aorta. The NADR can accurately assess the risk of aneurysm rupture by calibrating the relative amount of dilation of the aorta in the form of a ratio.

## ANALYSIS

Women typically have smaller AAAs than men,<sup>1</sup> yet the rate of rupture is up to five times greater in women than in men.<sup>2</sup> This increased rate of rupture is perhaps due to the fact that the aortic dilation may actually be much greater in many females when compared to some males who have the same diameter AAA, but have a smaller native aorta. (FIGURE 1 & 2)

Figure 1.

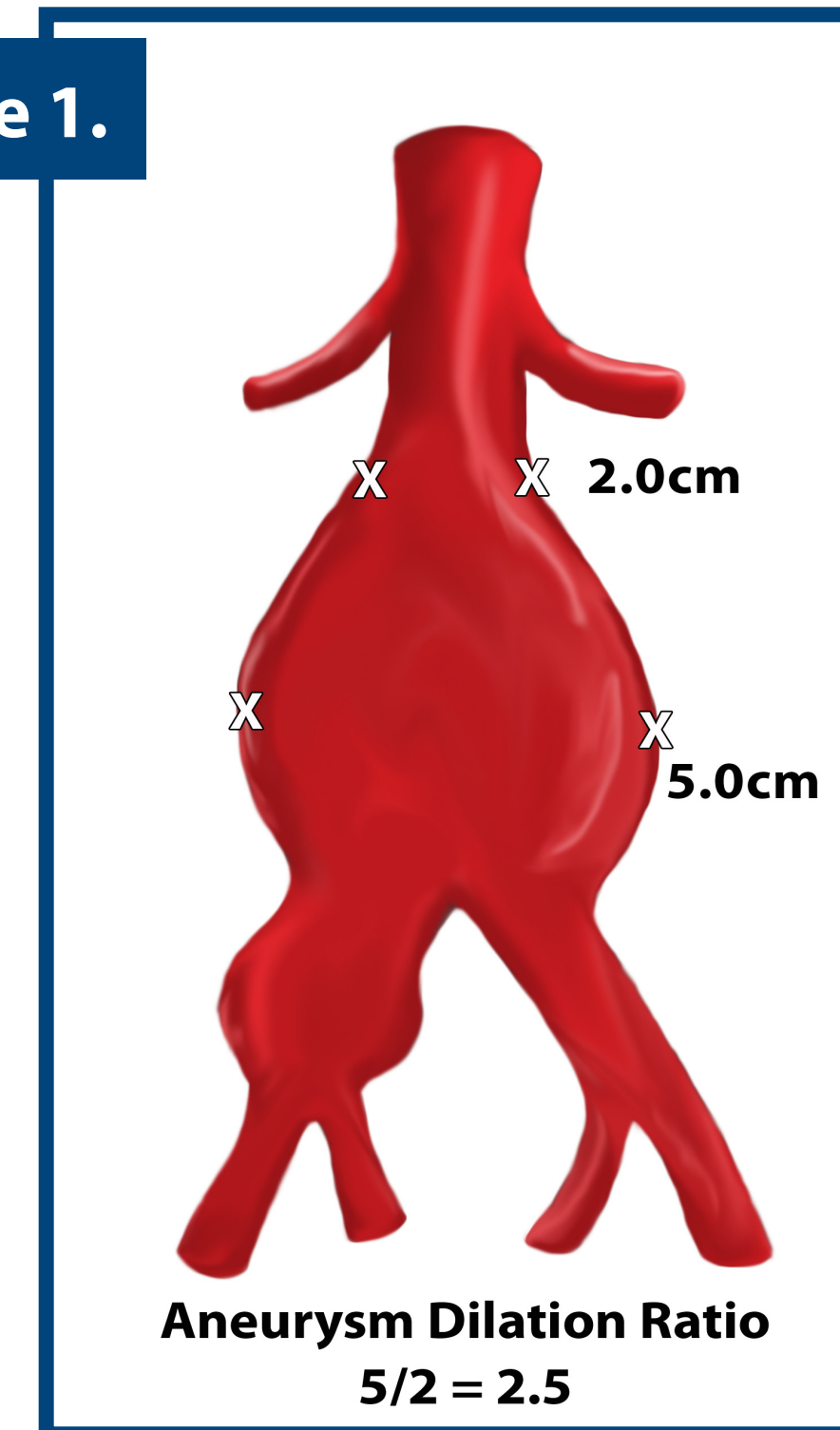


Figure 2.

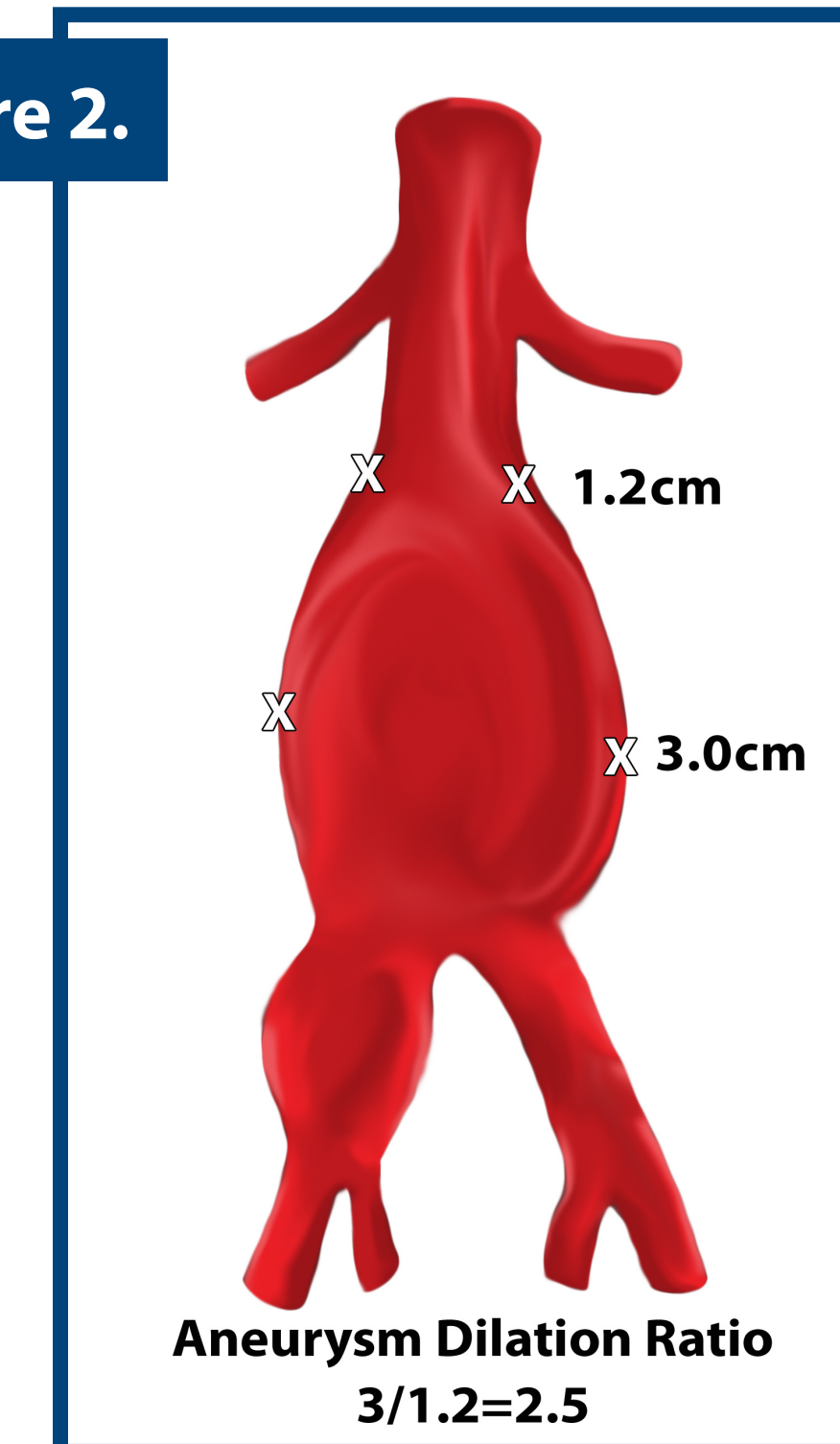


Table 1

Maximal Aneurysm Diameter	3.0 cm	3.0 cm	3.0 cm	3.0 cm
Native Aorta Diameter	1.0 cm	1.5 cm	2.0 cm	2.5 cm
Nussbaumer Aneurysm Dilation Ratio (NADR)	3	2.0	1.5	1.2

Table 2

Maximal Aneurysm Diameter	4.0 cm	4.0 cm	4.0 cm	4.0 cm
Native Aorta Diameter	1.0 cm	1.5 cm	2.0 cm	2.5 cm
Nussbaumer Aneurysm Dilation Ratio (NADR)	4	2.7	2.0	1.6

Table 3

Maximal Aneurysm Diameter	5.0 cm	5.0 cm	5.0 cm	5.0 cm
Native Aorta Diameter	1.0 cm	1.5 cm	2.0 cm	2.5 cm
Nussbaumer Aneurysm Dilation Ratio (NADR)	5.0	3.3	2.5	2.0

## ANALYSIS II

The average measurement of the normal aorta is 2.5 cm proximal, 2.0 cm mid and 1.5 cm distal. The ratio of 5:2 (average diameter indicated for AAA surgical repair: average mid aorta diameter) is considered for the baseline ratio calculation. It is predicted that a NADR of 2.5 or greater will correlate with an increased rate of rupture of AAAs. (TABLE 1, 2 & 3)

Smaller aneurysms, that would have previously been monitored, may now be considered for surgical repair and, larger aneurysms, measuring greater than 5 cm, may now be monitored, due to the large size of their native aorta.

## CONCLUSION

The NADR is a more precise method of evaluating AAAs than the current diagnostic diameter criteria.

The NADR more accurately determines the prognosis of AAAs than current methods.

## RECOMMENDATIONS

The NADR should be used with any modality when measurements of the aorta can be obtained, such as ultrasound, CT, and MRI.

Ultrasound is recommended for evaluation of the aorta and to implement the NADR because it is cost effective, non-invasive, efficient and accurate.

## REFERENCES

1. UK Small Aneurysm Trial Participants. Health Service Cost and Quality of Life for Early Elective Surgery or Ultrasonic Surveillance for small abdominal aortic aneurysms. Lancet. 1998; 352: 1656-1660
2. Arnell TD, de Virgilio C, et al., Abdominal Aortic Screening in Elderly Males with Atherosclerosis: the Value of Physical Exam. Am Surg 1996; 62: 861-4.