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INVITED COMMENTARY

Rupture in Small Abdominal Aortic Aneurysms: Beyond the Rates…

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Rupture of an abdominal aortic aneurysm (AAA) is unpredictable, rarely foreshowed by warning symptoms but lethal in 90%. There is now compelling evidence that the risk of rupture in small aneurysms is much lower than what was previously thought. The systematic review of Powell et al.[1] in this issue of *European Journal of Vascular and Endovascular Surgery* (EJVES) adds substantially to the published data on the rupture rate of small aneurysms. However, the available heterogeneous data did not allow the authors to provide strong suggestions, one of the major issues complicating the understanding of rupture in small AAAs being the dissimilar reporting of rates and diameter ranges over various follow-up lengths on an event rate that changes (and probably not constantly) over time. After retrieving more than ten thousands of articles, only 14 were eligible for the final analysis; but only seven selected studies (including 5934 AAAs) reported on conditional follow-up data where aneurysm size was known at the time of rupture. The authors calculated that the risk of rupture in aneurysms between 3.5 and 5.5 cm in diameter is extraordinarily low and ranges from 0 to 1.61 ruptures per 100 person-years. Of note, six out of the seven studies reported rates below 0.5 per 100 person-years; the only one showing higher rate analysed exclusively 5.0–5.4-cm aneurysms.

In spite of the demonstrated low risk of rupture, managing small AAAs continues to polarise opinions of interventionalists and conservative supporters around the world. Beside the rupture rates, a number of other reasons affect the uncertainty on the best management of small AAAs.

Fundamentally, we have not yet determined for how long a small aortic aneurysm will maintain that small size at negligible rupture risk. We cannot identify which small aneurysms grow faster than others to significantly increase their risk of rupture, the baseline diameter being obviously the main but not the only risk factor. Furthermore, the growth of aneurysms is probably not constant and is time-independent.[2] More worrying is the increasingly consistent evidence from randomised clinical trials (RCTs)[3,4] of a substantially high rate of patients (three-quarters after about 4 years)[3] with small AAAs assigned to surveillance that enlarge and reach the diameter threshold for repair. Powell's review clearly confirmed that no rupture occurred within 12 months in aneurysms smaller than 4.0 cm. These data indicate that studies regarding the management of small AAAs should focus merely on the 1-cm aneurysm diameter range of 4.0–5.0 cm. Below this threshold, there is no argument for repair, while decisions are consistently balanced in favour of repairing larger aneurysms. Combining 3.5 cm or less with 4.0–5.0 cm diameter aneurysms would confuse outcomes and growth rates.

The existence of an unidentified group of rapidly growing small AAAs raises the question as to whether

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a combination of diameter measurements and growth rates could be superior to diameter alone for predicting AAA-related events, while the need for precise measurements of diameter risk ranges during surveillance might better suggest using the same 6-month schedule for all the small AAAs within the 1-cm critical range of 4.0—5.0 cm. However, patients' adherence to strict surveillance protocols and reliability of rigorous health strategies are other factors that challenge the safety of surveillance protocols and their efficacy in preventing aneurysm rupture.

Another important reason underlying the uncertainty as how to best manage patients with small AAAs is a growing belief that improvements in what now constitutes 'best medical therapy' may reduce the risk of rupture. Control of blood pressure and diabetes, smoking cessation, use of statins and inflammatory cytokines manipulation have all been associated with hopeful lower rupture rates. None of these factors could be addressed by Powell's review because of lack of data. Unfortunately, the precise mechanisms initiating and stimulating the progression of AAAs are still poorly understood, and, unquestionably, there are a number of rapidly growing still unidentified subsets of small aneurysms.

Therefore, why, despite the small rate of ruptures, does a large sense of uncertainty regarding the management of AAAs with 4.0—5.0 cm diameter remain?

The main reasons, beyond the rates of rupture, include (1) our continued inability to precisely identify small aneurysms at high risk for rapid growth in which to target risk and cost of early intervention; (2) the reliability of screening and patients' adherence to surveillance protocol to keep the aneurysm rupture rate low; and (3) large insubstantiality about how to best medically manage the risk of enlargement and rupture of an aortic aneurysm.

In the meantime, disturbingly, intervening in small aneurysms represents today a practice for a number of surgeons and interventionalists around the world. Hopefully, mega observational studies will definitely clarify the issue of rupture versus treatment risk balance in AAAs from 4.0 to 5.0 cm, and provide established and evidence-based guidelines to consistently uniform management.

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