OHTAC Recommendation
Ultrasound Screening for Abdominal Aortic Aneurysms

January 24, 2006
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The Ontario Health Technology Advisory Committee (OHTAC) met on January 24, 2006 to review the utility of vascular ultrasound screening for abdominal aortic aneurysms identification in Ontario patients over the age of 65, based on a health technology policy review prepared by the Medical Advisory Secretariat, Ontario Ministry of Health and Long-Term Care.

An abdominal aortic aneurysm (AAA) is a localized, abnormal dilatation of the aorta greater than 3 cm. In community surveys the prevalence of AAA is reported to be between 2% and 5.4%. AAAs are found in 4-8% of men and in 0.5-1.5% of women ages 65 years and older. Abdominal aortic aneurysms are largely asymptomatic.

If left untreated, the continuing extension and thinning of the vessel wall may eventually result in rupture of the AAA, which most often occurs without prior warning.

Rupture is always life threatening and requires emergency surgical repair. The risk of death from ruptured AAA is 80% to 90%. Over half of all deaths attributed to ruptured aneurysm take place before the patient reaches hospital. In comparison, mortality in individuals undergoing elective surgery is only 5-7%, however symptoms of AAA rarely occur before rupture. Given that ultrasound can reliably visualize the aorta, with a sensitivity and specificity for diagnosing AAA approaching 100%, screening for aneurysms may reduce the incidence of ruptured aneurysms and hence reduce unnecessary deaths caused by AAA-attributable mortality.

The risk of rupture of an untreated AAA is a continuous function of aneurysm size as represented by the maximal diameter of the AAA. The annual rupture rate is near zero for aneurysms less than 4 cm in diameter. The risk is about 1% per year for aneurysms 4 to 4.9 cm, 11% per year for aneurysms 5 to 5.9 cm, and 25% per year or more for aneurysms greater than 6 cm. Elective open surgical repair (OSR) is generally considered appropriate for healthy patients with aneurysms starting at 5 to 6 cm in diameter. Treatment of smaller aneurysms through surgical repair is generally not considered appropriate because of the lower risk of rupture and the potential harms associated with surgical repair. Serial noninvasive follow-up of small aneurysms (less than 5.5 cm) is an alternative to immediate surgery that would apply to less than 5% of the screened individuals in a general population-based screening program.

In Ontario, there is currently no formal screening program for AAA, although individual ultrasound screening, an insured service, is at the discretion of the physician. Current detection is dependent on physician referral, symptomatic presentation or incidental detection.
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A partial ultrasound on only the aorta takes less than 10 minutes to perform. A clinic that is well organized may have the capacity to conduct up to six or more AAA screenings per hour by a college-trained ultrasound technician. In about 1% of patients, the aorta is not visualized on initial scan, often due to gassiness or obesity. A recall scan will often visualize the aorta reducing the need for more invasive and costly screening modalities such as CT and MRI.

In 1994, the Canadian Task Force on Preventive Health Care (CTFPHC) recommended that while there is insufficient evidence to recommend for or against screening with physical examination or ultrasound, physicians may choose to include a targeted physical examination for AAA in males over age 60.

In June 2005, the U.S. Preventive Services Task Force (USPSTF) recommended one-time ultrasound screening for AAA in men aged 65 to 75 who have ever smoked. Given the lower prevalence for large AAA in women and the low number of AAA deaths that can be prevented by screening, the USPSTF concluded that harms of screening women for AAA outweighed the benefits. Potential harms included increased number of surgeries and associated morbidity and mortality, and psychological harms (the worried well).

OHTAC Findings:

A systematic literature review conducted by the Medical Advisory Secretariat (MAS) yielded four large randomized AAA screening trials of moderate to high quality assessing the effectiveness of outcomes for population-based screening of asymptomatic populations. The results of the review indicate that one-time screening is effective in reducing the rupture incidence of AAA, reduces costly emergency repair of AAA, increases rates of elective surgical repair for AAA, and reduces the AAA-attributable mortality in men ages 65-74, particularly smokers, who are offered ultrasound AAA screening. Further analysis indicated that smoking is the largest risk factor for AAA, accounting for 89% of prevalent AAA. Smoking is also related to larger aneurysms, higher rates of aneurysmal growth, and a higher risk of rupture. AAA screening was found to be comparable in effectiveness to breast cancer screening and colorectal cancer screening based on the number of patients needed to screen to prevent one death. Basing a screening program on a population with a history of smoking would identify 89% (the majority) of asymptomatic AAAs. It would avoid screening 328, 461 Ontario patients who had never smoked and in whom AAAs are predicted to be very uncommon.
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Only one screening trial included women in their sample and found no benefit of screening at five and ten-year follow-up. However, this trial was insufficiently powered to detect any significant differences for AAA screening in women.

In Ontario, women account for 33% of all AAA deaths, as compared to reported prevalence rates of 17-25% of all AAAs. It is suggested in the literature that AAAs in women rupture later in life and more frequently at smaller diameters, and that some diagnosis guidelines fail to account for a smaller aorta in women. Moreover, Ontario data indicate that women have a significantly increased case-fatality rate of AAA (65%) in comparison to men (50%), and Ontario data also indicate a slightly older distribution of age at rupture incidence for women. There is also evidence in the Canadian literature that there is a bias against women not receiving appropriate access to surgical treatment of AAA. Overall, there is a lack of peer-reviewed literature examining AAA in women, yet Ontario data warrants the consideration of including women in an AAA screening program. Lastly, since smoking is a highly significant risk factor for AAA and the prevalence of smoking in women continues to increase, it can be expected that the incidence and prevalence AAA in women will increase as the cohort of female smokers reaches 60-65 years of age.

An economic analysis of potential AAA screening strategies indicated that screening is cost-effective when it is based on a history of smoking. It is also comparable to other screening programs in Ontario such as breast and colon cancer. The analysis included the financial impact of a screening program, the potential increase in costs for initial (limited, aorta only) screening and follow-up screening, and the number and hospital costs of elective surgical repairs of AAA. The cost of each ultrasound in Ontario is $53.80. Over a three-year intake the initial costs of screening may create increased demand for resources for repeat ultrasound of small AAAs and the elective surgical repair of large AAAs which deal with prevalent AAAs, not incident AAAs. However, it would also result in cost-savings resulting from the potential reduction by 15% of urgent surgical cases, based on current patterns.

The economic analysis yielded cost-savings at an average annual rate of $0.8M to $3M due to the reduction of hospital-based emergency AAA repairs. The cost per Quality-Adjusted Life-year of a screening program in high-risk males yielded a value of $33,860/QALY, which is considered cost effective.

Nevertheless, the incremental hospital budget impact attributed to increased surgical repair of AAA discovered by screening may range between $24M to $56M if the prevalent population is treated over a 5 year period, following which the repair rate would fall considerably and cost savings in 2011 would be estimated to be between $1.7M and $6.0M.
OHTAC Recommendations:

Based on the above findings, OHTAC recommended:

- Screening for AAA for all men and women ages 65 – 74 years with a history of smoking
- Evaluation of AAA screening outcomes, particularly in women, is essential due to the paucity of data on AAA screening in women
- An implementation strategy be developed to effectively roll out AAA screening including involvement by the Ontario College of Family Physicians and the Ontario Guidelines Advisory Committee to promote AAA screening.