Infective endocarditis prophylaxis for valvular heart disease – Should we follow the current guidelines?

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Infective endocarditis is an infection of the cardiac endothelium. It is a grave disease with high incidence of complications and adverse events. Cardiac complications include cardiac failure, valve dehiscence, fistula formation, perivalvular abscesses, conduction system disturbances, purulent pericarditis etc. Complications can arise from septic emboli either to pulmonary circulation from right sided endocarditis or to the systemic circulation from left sided endocarditis. Mycotic aneurysms are another serious problem. Then there are immunological complications like glomerulonephritis, arthritis etc.

It is a universally fatal disease if left untreated with nearly 100% mortality. Even with treatment the overall mortality is around 20%. Factors of poor outcome include cardiac failure, non streptococcal infection, aortic valve involvement, prosthetic valve endocarditis, older age, abscess formation, CNS or coronary embolization, recurrent IE, HIV CD count <200 etc.

Treatment of IE is cumbersome. Bactericidal antibiotics should be given parenterally and for many weeks.

Therefore IE is a serious problem with life threatening complications, poor prognosis and difficult treatment. Hence as always in medicine and in general in life, prevention is better than cure.

So it has long been considered that all patients with cardiac lesions predisposing to IE should receive antibiotic prophylaxis when undergoing procedures that can lead to bacteremia with organisms known to cause endocarditis. AHA has published guidelines for IE prophylaxis since 1955. Three major variables have been considered for formulating guidelines—the lifetime risk of endocarditis due to the underlying heart condition, the likelihood and nature of bacteremia following the procedure, and the risk of adverse effects from antibiotic therapy. The lifetime risk associated with the cardiac condition was divided into three risk categories and the likelihood of bacteremia from a procedure was similarly divided into risk categories. Thus, prophylaxis has been firmly recommended for patients with an underlying heart condition who are at high risk of endocarditis and are undergoing a procedure that has a high risk of leading to significant bacteraemia. Conversely, it has not been recommended for patients with conditions who are at low risk of endocarditis and are undergoing procedures with a low risk of leading to significant bacteraemia. Prophylaxis has been “possibly” and “probably” recommended for various intermediate-risk combinations.

Over the past 10 years, thinking has changed for three main reasons. First, there is now strong evidence that bacteremia with endocarditis-causing organisms frequently occurs following every day activities, such as tooth brushing. Second, it has been recognised that very few cases of endocarditis can reasonably be attributed to a preceding procedure and are more likely to have resulted from everyday activities. Third, it has been realised that we should be more concerned about patients who are likely to have a poor outcome if they develop endocarditis than those who are at high risk of developing endocarditis at all. In the context of this change in thinking, organisations around the world (including the AHA) have published new guidelines for endocarditis prophylaxis that differ considerably from the previous versions.

AHA guidelines have been revised in 2007. The reasons for revision in guidelines have been

1) Endocarditis - more likely to result from frequent random bacteremias associated with daily activities, than from an isolated bacteremia associated with a procedure.

2) Risk/Benefit - (adverse effects & antibiotic resistance) Risk likely exceeds any benefit gained from use of antibiotics

3) Maintaining Optimal Oral Hygiene - reduces the risk of bacteremia associated with normal daily activities more importantly than prophylactic antibiotic use

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AHA recommends - There should be a “shift away from focusing on (dental) procedures, & a greater emphasis placed on “access to oral health care” for patients with underlying cardiac conditions. Cardiac conditions associated with highest risk of adverse outcomes & for which antibiotic prophylaxis is “reasonable” (with dental procedures) - 2007 AHA recommendation

Previous Endocarditis
Prosthetic Cardiac Valves
Heart Transplant patients who have valvulopathy.
Congenital Heart Disease (CHD) – only the following conditions;
- Unrepaired Cyanotic CHD - including palliative shunts & conduits.
- Completely repaired congenital heart defects with prosthetic material or devices (placed surgically or by catheterization) during the first 6 months after the procedure
- Repaired CHD with residual defects.

I.E. Antibiotic prophylaxis: Summary of major changes; AHA 2007
1) Antibiotic prophylaxis for dental procedures “is reasonable” only for patients with underlying cardiac conditions associated with the “highest risk” of adverse outcomes.
2) For this group, prophylaxis “is reasonable” for all dental procedures involving “manipulation of gingival tissue”, (peri-apical region of the teeth) or involving “perforation of the oral mucosa”.
3) Prophylaxis is NOT recommended based solely on an increased “lifetime risk of acquiring IE.”
4) Prophylactic antibiotics based “solely to prevent” IE for patients undergoing GI or GU tract procedures is “No Longer Recommended”

All regimens of antibiotic prophylaxis were based on consensus opinion rather than any solid evidence basis. Randomised controlled trials were obviously rather difficult to undertake as ethical considerations were involved (in withholding prophylaxis to one group) and due to the large number that is required to conduct a RCT (after all IE is not a very common disease)

Concerns regarding antibiotic prophylaxis were 1) hypersensitivity reactions 2) emergence of resistance – widespread use may promote emergence of resistant viridans group strep and enterococci, resulting in decreased effectiveness of IE treatment regimens and 3) cost of prophylaxis

The benefits of new guidelines have been described as 1) simple and has greater clarity than old 2) fewer people now require to be given prophylaxis

Let us take a look at the scenario in the west, from where these old and new guidelines have come from.

The incidence of IE in western countries is estimated to be 1.7 to 6.2 cases per 100,000 person years. The higher incidence is mainly associated with intravenous drug use. There is also a higher risk associated with increasing age and greater use of prosthetic heart valves. There has been a marked decrease however in rheumatic fever in Western countries. Indeed, with the ability to prevent further episodes of rheumatic fever with antibiotics, and the general reduction in rheumatic fever incidence in Western countries, the prevalence of rheumatic valvular disease is declining and is now confined to an ageing cohort of patients affected in their youth and to specific groups such as Australian aborigines, Pacific islanders and certain migrant groups.

What statistics say about number of IE cases possibly related to dental procedures

“General” population
- 1 case per 14 million procedures

For “High Risk” population:

MVP - 1 case per 1.1 million procedures
CHD - 1 “ per 475,000 “
RHD - 1 “ per 142,000 “
Prosthetic Valves - 1 “ per 114,000 “
(+) Hx of IE - 1 “ per 95,000 “

Oh, East is East, and West is West, and never the twain shall meet (The ballad of east and west – Rudyard Kipling)

RHD in India

RHD is still a major issue in India. The prevalence is estimated to be around 2.1 per 1000. i.e: half a million children and 1.4 million adults are thought to be suffering from it. The incidence is approximately 0.54 per 1000 per year. Which means 130,000 people get rheumatic fever every year. Therefore we can understand that rheumatic fever is still a major health issue in India.

And if we look at the issue of the proportion of IE with RHD as the predisposing factor, from the various studies on Asian population (Circulation 2008), the Indian studies have estimated it to be ranging from 42 to 68 percent.
The studies on infective endocarditis confirm that in most Asian countries, at least half of all cases of this severe and often fatal disease are due to underlying rheumatic heart disease.

Let us look at one developed country which has a significant number of population who suffer from some of the same disadvantages that medically and socioeconomically deprived people in India suffer from.

Australia has a significant number of aborigines. The only significant difference between the new Australian guidelines and the AHA guidelines is that rheumatic valvular heart disease in Indigenous Australians has been retained in the list of cardiac conditions for which prophylaxis should be given. Experienced clinicians have the strong impression that the outcome of endocarditis in Indigenous Australians is poorer than in non-Indigenous Australians, possibly in part because of delays in diagnosis and therapy.

Isn’t this applicable to many parts of our country also?

Oral hygiene – Paramount importance given in new prophylactic regimens

The new guidelines place very strong emphasis on maintenance of good oral hygiene in prevention of IE. It is a very commendable decision and one that every society should strive to achieve. But coming down to ground reality in India, some studies have brought out the abysmal levels of oral health prevailing in our part of the world. The Consumer Usage and Attitudes survey conducted by IMRB has this to say: “Amongst the most shocking of revelations is that nearly half of Indians do not use a toothbrush. Only 28% participants said they brushed their teeth twice a day. Unsurprisingly standards of oral health are very poor in India, with a large proportion of the population affected by conditions such as gum disease and tooth decay. In addition to this two-thirds of people have never seen a dentist.”

And when the sky does fall…..

AHA guidelines 2007 says...

Antibiotic prophylaxis for dental procedures “is reasonable” ONLY for patients with underlying cardiac conditions associated with the “highest risk” of adverse outcomes.

Prophylaxis is NOT Recommended based solely on an increased “lifetime risk of acquiring IE”.

But .... Shouldn’t we consider availability of treatment options when that risk becomes real?

Statistics – what do they tell of Indian situation

• 7 doctors, 7.85 nurses per 10000 population
• Total expenditure on health (THE) – 4.8% of GDP (25% public, 75% private)
• Out of pocket spending on private health care –70-80%

• Medical insurance coverage 0.2% India Vs 75% USA

Number of hospital beds per 1000 population
UK – 3.9        USA – 3.1        India – 1
( WHO norm 1/300)

Obviously health care in many parts of India leaves much to be desired

Logical?

Cost of treatment as far as antibiotic prophylaxis is considered is much cheaper compared with cost of weeks long inpatient treatment with parenteral antibiotics in India

To summarize

• Both current and old guidelines based more on consensus opinion of experts than strength of evidence
• We may never be able to measure precise effectiveness of ABP
• In clinical cardiology we have to face situations where the clinical evidence base does not completely apply to a particular patient at hand.
• Evidence in favour of ABP is weak... But so is evidence against!!!!!!!
• Revision in guidelines – based around reevaluation of weak historical evidence rather than high-quality clinical trials

Absence of evidence should not be regarded as Evidence of absence

• Case for antibiotic prophylaxis for all is simple. IE is a very serious disease with high mortality and morbidity
• Decades of clinical experience shows certain patients are at increased risk
• Dental work is associated with bacteremia
• Antibiotics kill bacteria cheaply, effectively, with low toxicity
• Even in absence of solid evidence, if antibiotic prophylaxis prevents a minority of IE --- isn’t it preferable?

Finally coming back to AHA (where we started off…)

• New recommendations included in 2008 ACC/AHA Valvular Heart disease management guidelines update
  • BUT.....it also included this statement regarding individualization of treatment strategies based on physician and patient preferences
  • In select circumstances, the committee understands that clinicians and patients may still feel more comfortable continuing with antibiotic prophylaxis, particularly for those with Bicuspid AV, Coarct of Aorta, Severe MVP or HOCM

Shouldn’t India add RHD to that?