

Prophylactic Antibiotics in Surgery

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Practice of surgery has evolved by leaps and bounds in last century. This evolution is a result of many landmark developments that were nothing short of revolutionary. These landmark developments enabled surgery to progress from being life saving to function and form preserving. At the same time, the practicing surgeon moved from benchmarking the outcomes from merely clinical to those that are patient reported. The landmark developments have been, our better understanding of anatomy, development of anaesthesia and concept of antisepsis. Antisepsis contributed significantly in lowering the postoperative morbidity and mortality. With the emphasis shifting to patient reported outcomes (PRO), health related quality of life (HrQoL) and optimization of healthcare resources, an awareness to minimize the postoperative wound infections received fresh impetus^{1,2}.

Antibiotics in their original avatar were used as therapeutic agents for a demonstrable infection. Since no antisepsis could be foolproof and no living tissue could be absolutely impregnable by pathogen, a thought of pre-emptying the embedding of pathogen seemed worthy of being entertained. Thus was born the concept of using antibiotics prophylactically.

The concept of prophylactic antibiotics was first studied by Miles in 1957 and Burke in 1961^{3,4}. I was guided by Professor N. Singh, the then head of Surgery at Lady Hardinge Medical College, to study this concept in India in 1985, leading to publication of a thesis and paper^{4,5}. Years of study have led to following concepts

1. Antibiotic prophylaxis should be given at right time.
2. Duration of administration of the prophylactic antibiotic should be shortest possible but long enough till necessary.
3. Antibiotic to be used should be effective against potential pathogen.
4. Administration should be systemic.

The most optimal time of administration has been found to be ½ hr preoperatively⁵. It has been seen that infection rates were 15%, 4%, 3% and <2% with the administration being 1 hour postoperative, 12 hrs preoperative, 1 hr preoperative and ½ hr preoperative, respectively. This is borne out of the fact, that the driving force behind penetration into tissue is the sum of serum concentration over time as shown by application of Pick's equation for diffusion.

Prophylactic use of antibiotics applied scientifically has led to improved outcomes that impact the PROs, HrQoL and social cost, but they can't be a panacea for postoperative wound morbidity. The real prophylaxis must start much before surgery i.e. from patient himself in a structured manner as follows^{7,8}.

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- Patient should be advised to have a bath / bed bath using soap on the day of surgery.
- Patients should have specific theatre wear appropriate for procedure and having respect to dignity and comfort of the patient.
- Hair removal from non hirsute areas should be avoided.
- If necessary hair removal be done using disposable clipper and not a razor.
- The clinical staff interacting with the patient should wear specific nonsterile theater wear.
- Movement of personnel in and out of operating area should be minimum.
- Operating staff shouldn't be wearing hand jewellery, artificial nails and nail polish.
- A standard, structured protocol of antisepsis should be followed during scrubbing and wearing operative garments.
- Skin of surgical site should be prepared properly using antiseptic solutions.
- Use of atraumatic technique in surgery including avoiding energized dissection so as to minimize remnant dead tissue which is a fertile ground for pathogen.
- Use of monofilament sutures should be preferred.
- Avoid intraoperative hypoxia, hypotension and hypothermia. All of these impede the delivery of functional phagocytes.

All said and understood, antibiotics should not be misused to cover up for poor surgical approach as was echoed by Dr. William A. Alteemeier, who often said, "I am afraid that prophylactic antibiotics will be used to compensate for sloppy surgery".

This is a serious concern because inappropriate use of antibiotics not only leads to enhanced economic burden on society but more immediately leads to rapid emergence of resistant pathogen, selection pressure on resistant micro-organisms, treatment failures, allergies and culmination into preventable mortality and morbidity.

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