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Review Article

The Current Ideology of Antibiotic Therapy in Obstetrics and Gynaecology

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ABSTRACT

This article displays the current principles in therapy of antibiotics. It also explains the various guidelines for safe usage with precise choice of antibiotics in obstetrics and gynaecology including prophylaxis in prevention of surgical site infection. The efficacy of prophylactic antibiotics has been well established in obstetrics and gynaecologic surgery. The antibiotic administration is effective at reducing infection when administrated just before the surgical incision is made.

Keyword: Antibiotics; Principles; Infection; Obstetrics; Gynaecology

INTRODUCTION

The World Health Organisation (WHO) estimates more than 50% of antibiotics in many countries are used inappropriately. Hence in its latest advisory, WHO suggested the adoption of access, watch and reserve; an approach that specifies which antibiotics to use for the most common and serious infections, which ones ought to be available at all times in the healthcare system and those to be used sparingly or reserved or used as last resort. WHO has also urged all countries to adopt these guidelines including an Antibiotic Stewardship Programme (ASP) to reduce the antimicrobial resistance, adverse events and costs of the treatment [1-5].

Multiple studies had confirmed this fact in surgeries including cesarean section and other gynaecological surgeries. Despite that, Surgical Site Infections (SSIs) continue to be a major source of morbidity, mortality and hospital cost. We need to take a special care while using antibiotics in Pregnancy considering the mother and child. The women will have altered physiology in pregnancy like increase in renal blood flow leading more clearance of antimicrobial agents compare to others. In case of developing foetus many antibiotics can be either teratogenic or otherwise toxic to the foetus. Some women are more likely to get a post-cesarean wound infection and gynaecologic surgical site Infection. Risk factors are obesity, diabetes mellitus ,anaemia ,an immunosuppressive disorder, those who are taking long-term steroids, poor prenatal care, previous caesarean deliveries, , chorioamnionitis , lack of cautionary antibiotics or pre-incision antimicrobial care, a long labor or surgery, excessive blood loss during labour, delivery and surgical procedures [6-9].

LITERATURE REVIEW

The incorrect use of antibiotics and easy access fuels antibiotic resistance which is a growing concern worldwide today. The recent Indian study confirmed the over usage of antibiotics in our country with antibiotic prescription rate is high in private sector and advocated Antibiotic Stewardship Programmes (ASP) in the health care institutions-An organizational or health care system wide approach to promote and monitor the judicious use of antibiotics to preserve the future effectiveness. This study also highlighted that primary care physicians in the private sector of our country can play a key role in reducing antibiotic misuse and overuse. The health department of government of India through its Indian council of medical research and national centre of disease control had laid down guidelines in Antimicrobial usage in our country focusing the effectiveness and cost reduction. These guidelines are advocating the precise choice of antibiotics and duration to be used in all specialities including obstetric and gynecologic surgeries. Surgical site infection in obstetric and gynaecologic surgery is a serious complication ranges from 7%-10%. It may be superficial to very deep infection which leads to increase morbidity and cost of treatment. Today the medical sphere is advising antibiotic stewardship programmes in all the hospitals. The goals of these programmes are to decrease hospital acquired infections, control costs and prevent complications associated with antibiotic usage (eg. renal damage, clostridium difficile infections). The stewardship team consists of microbiologists, surgeons, infectious disease specialists, clinical pharmacists, infection control and prevention practitioners [10].

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Micro-organisms prevalence, prophylaxis and antibiotic therapy in obstetrics and gynaecological diseases

The importance of prophylactic antibiotics in obstetrics and gynaecological surgery has been well documented today. It is advised to give Intravenous antibiotic injection 30-60 minutes before skin incision. Current guidelines recommend the prophylactic antibiotics should be discontinued within 24 to 48 hours of surgery completion. However continue the antibiotics while drainage tubes are in place. Also there is evidence suggesting that there is no antibiotic needed for the normal vaginal delivery. Diphteria and tetanus vaccine are to be provided as per the International guidelines during the pregnancy. Obstetrics and gynaecological surgery is a unique speciality where the upmost care in prevention of Infection is warranted. The following tabloid exhibits the specific organisms and their choice of antibiotics in obstetrics and gynaecological surgery (Table 1) [11].

Table 1: The display of organisms and choice of antibiotics in obstetrics and gynaecological diseases.

Disease/Infection/ Condition	Microorganisms	Antibiotics with duration	Notes	Route
Vaginal delivery with the history of fever during labour, chorioamnionitis and history of previous baby with Infection, urinary tract infection	Group B Streptococci (GBS)	First choice-Inj. ampicillin 2 gm followed by 1 gm 4-6 hrly till delivery	Not recommended routinely for normal vaginal delivery	Intravenous
		Second choice-Inj. cefazolin 2 gm followed by 1 gm 8 hrly till delivery	-	
		If allergic-Inj. vancomycin 1 gm 12 hrly till delivery	Delivery is considered akin to drainage of an abscess as the fetus and placenta is removed which are the nidus of infection	
3rd or 4th Degree perineal tear	Gram positive-*S. aureus*	First choice-single dose cefoxitin or cefotetan 1 gm	Prophylaxis is considered to prevent adverse outcomes arising from Infection Eg., fistulas	Intravenous
	Gram negative-*Enterobacteriaceae* anaerobes	Second choice -Inj. cefazolin 1 gm plus Inj. metronidazole 500 mg or single dose Inj. cefuroxime 1.5 gm plus Inj. metronidazole 500 mg or single dose Inj. amoxicillin-clavulanic acid 1.2 gms		
Preterm labour, prolonged rupture of membranes	Gram positive-GBS Gram negative-enteric gram negative bacilli, ureaplasma, mycoplasma anaerobes including G. vaginalis	Inj. ampicillin 2 gm followed by 1gm 4-6 hrly for 48 hours followed by oral amoxycillin 500 mg 8 hrly for 5 days plus oral erythromycin 333 mg 8 hrly for 7 days	If erythromycin 333 mg is not available, kindly use erythromycin steatrate 250 mg 6 hrly for 7 days	Intravenous and oral
Caesarean section delivery (LSCS)	Polymicrobial	Single dose of Inj. cefazolin 2 gm	If the patient is >120 kg then kindly give Inj. cefazolin 3 gm	Intravenous
	Gram positive aerobes-GBS, staphylococci, enterococci	If allergic single dose of Inj. clindamycin 600-900 mg and Inj gentamycin 1.5 mg /kg	Puerperal endometritis is polymicrobial (aerobic-anaerobic) these organisms are part of vaginal flora and are introduced into the upper genital tract during vaginal examinations in labour and /or instrumentations during surgery	
	Gram negative Aerobes-*E Coli, Klebsiella*, proteus			
	Anaerobic gram positive cocci- peptococci, peptostreptococci			
	Anaerobic gram negative bacilli			
	Bacteriodes, *Prevotella* spp			

	Facultatively anaerobic gram- variable rod *G. vaginalis*		Tida et., al showed the addition of T. Azithramycin to Inj. cefazolin for LSCS reduced endometritis and wound infection significantly	
Rescue cervical encerclage	Vaginal flora	Injection ampicillin 2 gm single dose	To prevent ascending infection from vaginal flora to exposed membranes	Intravenous
Puerperal sepsis/ septic abortion/ chorioamnionitis	Gram positive- Streptococci (A,B,D), *S. aureus* Gram negative- *E. Coli, Enterobacteriaceae* including *Klebsiella*, *Enterobacter*, *Citrobacter*, *Psuedomonas aeruginosa*, *Proteus mirabilis*, *Gardenella vaginalis*, *Bacteroides*, *Clostridium perfringes*, Anaerobes	Inj. and piperacillin tazobactem 4.5 gm 8 hrly for 7-14 days or Inj. clindamycin 600-900 mg IV 8 hrly and Inj. gentamycin 60 mg IV 8 hrly and Inj. metronidazole 500 mg IV 8 hrly or Inj. ampicillin- sulbactum 3 gm IV 6 hrly	Usually polymicrobial	Intravenous
Hysterectomy (AH, VH, laparoscopic) and surgeries for pelvic organ prolapse and/or stress incontinence	Polymicrobial gram positive staphylococci Gram negative Enterococci, aerobic gram negative Anaerobes *Bacteroides* Spp.,	Single dose of Inj. cefazolin 2 gm or Inj. cefuroxime 1.5 gm single dose. If the patient is >120 kg then kindly give Inj. cefazolin 3 gm. If allergic to cephalosporins. Kindly use Inj clindamycin 600- 900 mg and Inj. gentamycin 1.5 gm/kg	In AH and VH, the vagina is opened at end of procedure and exposure to the vaginal flora is brief In VH, there is greater colonisation of surgical site. In AH for cancer with resection of upper vagina, there may be colonisation with anaerobes. In such cases Inj. metronidazole IV may be added. If BV is suspected oral metronidazole 500 mg BD for 7 days is given, beginning atleast 4 days pre-op	Intravenous and Oral
Laparoscopy (Uterus and/or vagina not entered)/Hysteroscopy/ Ectopic pregnancy	Skin commensals: *S. aureus*	Inj. cefazolin 1 gm single dose or Inj. cefuroxime 1.5 gm single dose	If allergic to cephalosporins kindly use Inj. clindamycin 600 mg	Intravenous
Abortions (Medical and Surgical)	Chlamydia, *Neisseria gonorrhoeae*	T. azithromycin 1 gm plus T. metronidazole 800 mg at time of abortion or	No prophylaxis for missed/Incomplete abortion	Oral

		doxycycline 100 mg orally twice daily for 7 days, starting on day of abortion plus T. metronidazole 800 mg orally at the time of abortion		
Candidiasis	Candida species-C. *albicans*, C. *glabrata*, C. *tropicalis*	Fluconazole oral 150 mg single dose with intra vaginal agents as creams or suppositories clotrimazole, micanozole, nystatin as single dose for 7-14 days	Treat for 7 days in pregnancy and diabetes. For recurrent candidiasis the patients need 6 months suppressive treatment with fluconazole 150 mg oral once a week and clotrimazole vaginal suppositories 500 mg once a week	Oral and vaginal
Bacterial vaginosis	Polymicrobial and overgrowth of anaerobes (*Gardnerella vaginalis*)	Metronidazole 500 mg oral BD for 7 days with metronidazole vaginal gel HS for 7 days/Tinidazole 2 gm oral OD for 3 days and 2 % clindamycin vaginal cream 5 Gm HS for 5 days	Treat the Partner as well. Avoid sexual activity or use condoms during the treatment. Clindamycin cream is oil based and might weaken latex condoms	Oral and vaginal
Trichomoniasis	*Trichomonas vaginalis*	T. secnidazole 2 gm single dose or T. tinidazole 500 mg orally twice daily for 5 days or T. metronidazole 400 mg twice daily for 7 days	Longer duration than 6 weeks may be needed. Also treat the sexual partner with metronidazole 2 gm as single dose Alcohol intake should be avoided during the treatment and after treatment for 72 hours with metronidazole and tinidazole to reduce the disulfiram like reaction	Oral
Cervicitis/Urethritis	Polymicrobial	Inj. ceftriaxone 250 mg IM Single dose plus T. azithramycin 1 gm single dose or T. doxycycline 100 mg BD for 7 days	Out-patient treatment	Intramuscular and oral
Lower urinary tract infection	Polymicrobial	Non pregnant women- T. nitrofurantoin 100 mg BD for three days pregnant women-avoid in full term- T. furantoin 100 mg BD for 7 days or T. cephalexin 500 mg BD for 7 days	T. paracetomol for pain	Oral
Asymptomatic bacteriuria in pregnant women >1,00,000cfu/ml of bacteria of same species in 2 urine cultures obtained 2-7 days apart	*Escherichia coli*	T. nitofurantoin 100 mg BD-avoid at term-0 or cephalexin 500 mg BD or T. amoxicillin 500 mg TDS-based on recent culture and susceptibility results	Do screen in first trimester. Can Cause Pyelonephritis in upto 25% of all pregnancies and treat them in Longer duration	Oral

Mucopurulent gonococcal cervicitis/Urethritis	Gonococci	T. cefixime 400 mg orally Stat plus T. metronidazole 400 mg BD for 14 days plus C. doxycycline 100 mg BD for 14 days	T. levofloxacin 400 mg OD for 14 days or T. ofloxacin 400 mg OD for 14 days with or without T. metronidazole 500mg BD for 14 days or Inj. ceftriaxone 250 mg IV single dose plus C. doxycycline orally 100 mg BD for 14 days with or without T. metronidazole 500 BD for 14 days	Oral and intravenous
Pelvic inflammatory disease (Mild to moderate)-salpingitis	*Staphylococcus aureus*, *Enterobacteriacae*, gonococci, gardenella	T. cefixime 400 mg orally Stat plus T. metronidazole 400 mg BD for 14 days plus C. doxycycline 100 mg BD for 14 days	An attempt should be made to obtain cultures and de-escalate based on that. Duration is two weeks, but can be extended depending upon clinical situation. Antibiotics may be altered after obtaining culture reports of pus/or blood	
Pelvic inflammatory disease (Severe)- tubo-ovarian abscess, pelvic abscess	*N. gonorrhoeae*, *C. trachomatis* and anaerobes, *E. Coli*, bacteroides, GBS, GAS, *S. aureus*, respiratory pathogens-*H. influenzae*, *S. pneumoniae*	Inj. cefotetan 2 gm IV BD plus T. doxycycline 100 mg orally BD or Inj. cefoxitin 2 gm IV every 12 hours plus C doxycyline orally every 12 hours or Inj. clindamycin 900 mg IV every 8 hours plus Inj. gentamycin loading doses IV or IM (2 mg/kg) every 8 hours, single daily dosing (3-5 mg/kg) can be substituted	An attempt should be made to obtain cultures and de-escalate based on that. Duration is two weeks, but can be extended depending upon clinical situation. Antibiotics may be altered after obtaining culture reports of pus/or blood	
Genital herpes	Herpes simplex virus type 2	Aciclovir 400 mg TDS for 5 days-If recurrent 800 mg TDS for 2 days or Valaciclovir 500 mg BD for 5 days or Famiclovir 1000 mg BD for recurrent Infections for a day	Advised saline bathing, analgesia, topical lidocaine for pain	Oral
Mastitis (Breast) without abscess	*Staphylococcus aureus*	Injection Co- amoxyclav (1.2 Gms) BD/Injection ceftriaxone 2 gm OD	In MRSA clindamycin 300 mg QID/Vancomycin 1 Gm 12 mg/Kg IV BD/ Teicoplanin 12 mg/kg IV BD as three doses followed by six doses as OD	
Mastitis (Breast) with abscess	*Staphylococcus aureus*	Incision and drainage with antibiotic cover for MRSA Inj. clindamycin 300 mg QID or Inj. vancomycin 15 mg/Kg IV 12 hourly (maximum 1 gm 12 hourly)/Inj. teicoplanin 12 mg/kg IV 12 hourly for 3 doses followed by 6 mg once daily IV		

Prevention of Surgical Site Infection (SSI), Surgical bundles and Antibiotic Stewardship Programme (ASP) in Obstetrics and gynaecological surgery. The Preoperative antibiotics with cephalosporins and azithromycin, glycemic control, skin preparation with chlorhexidine, hair removal with clippers just before surgery, povidine-Iodine vaginal cleaning prevents significantly the infection in obstetrics and gynaecologic surgeries. Also the intraoperative measures like avoiding the manual removal of placenta but by the gentle traction of umbilical cord, subcutaneous closure when the subcutaneous thickness measures greater than 2 cm and avoiding skin stables for skin closure, using prophylactic negative pressure wound therapy are reducing significantly the surgical site infection. Also postoperatively removing the dressing after 24-48 hours with daily bathing with chlorhexidine impregnated wash clothes lowers the risk of infection [12].

Presently, the above mentioned Perioperative surgical bundles of evidence-based practices and the antibiotic stewardship programme in all the clinical establishments is advised in order to reduce and manage surgical site infections with judicious use of antibiotics. Their efficacy had been shown with good results in challenging the micro organisms. A multidisciplinary team approach in the antibiotic stewardship will lead to improved patient outcomes and cost-effective medical care. Following principles play a crucial part in the ASP in providing high-quality obstetric and gynaecologic surgical care [13].

- Determining appropriate indications of antibiotic administration
- Choosing the correct antibiotic based on known or expected pathogens
- Determining the correct dosage and
- Determining the appropriate duration of treatment

These programmes direct and provide expert guidance on judicious usage of antibiotics.

DISCUSSION

Certain factors contribute infection in surgery. It may be patient factor or procedural factor. The patient factors are extremes of age, immunosuppression, diabetes mellitus, anaemia, smoking, prolonged hospital stay, co-existing infections at other sites, obesity, malnourishment and carriage of resistant organisms. The procedural factors are surgical technique, longer surgical duration, inadequate haemostasis, variations of body temperature, skin antisepsis, operating theatre ventilation and air changes, the presence of foreign body, tissue trauma and preoperative shaving of hair [14].

Microbiological diagnosis is very important in diseases caused by spectrum of bacterial species. Antibiotic use for non-bacterial infections leads to risk of development of bacterial antibiotic resistance. Correct diagnosis of specific bacterial infection is the key to limiting unnecessary prescription. Bacterial eradication should be the primary goal of antibiotic therapy. Antibiotic choices must reflect local resistance prevalence. We have to think of pharmacokinetics and pharmacodynamics to choose most effective agent and dosage. Do consider local resistance, efficacy and maximise cost-effectiveness while prescribing antibiotic therapy. We have to prescribe antibiotics empirically but intelligently. We have to encourage patient compliance. For patients with recurrent infections, consider taking microbiological samples and review the antimicrobial prescription when the results are available. Avoid treatment for colonization without evidence of infection unless there is a clear indication in the guidelines [15].

CONCLUSION

We need to take upmost care and apply principles of safe medical practice in obstetrics and gynaecology. With regard to infection, the high Index of suspicion is warranted following disturbed labour and other gynaecological surgeries. The choice of antibiotics depends on antibiotic susceptibility of the causative organism in these challenging situations. The most effective, least toxic and least expensive antibiotic for the precise duration of time is needed to cure or prevent infection. The antibiotic chosen must cover the main contaminant flora present in the skin or mucosa disrupted by the incision. The National guidelines are to be followed for the antibiotic prescription in obstetrics and gynaecological surgery with the shortest effective course, most appropriate dose with right route of administration. It is highly recommended to implement antibiotic stewardship programme in all the health establishments providing gynaecology and obstetric care.

REFERENCES

1. Varley AJ, Jumoke Sule, Absalom AR. Principles of antibiotic therapy, continuing education in anaesthesia. Crit care Pain. 2009;9:184-88.
2. Kaiser AB. Antimicrobial prophylaxis in surgery. Eng J Med. 1986;315(18):1129-1138.
3. Leekha S, Terrell CL, Edson RS. General principles of antibiotic therapy. Mayo Clin Proc. 2011;86(2):156-167.
4. Salkind AR, Rao KC. Antiobiotic prophylaxis to prevent surgical site infections. Amer Family Phy. 2011;83(5):585-590.
5. Tida ATN, Szychowski JM, Boggess K. Adjunctive azithromycin prophylaxis for caesarean delivery. N Engl J Med 2016;375:1231-1241.
6. Lachiewicz MP, Moulton LJ, Jaiyeoba O. Pelvic surgical site infections in gynecologic surgery. Infect Dis Obstet Gynecol. 2015;18;2015.
7. Kawakita T, Landy HJ. Surgical site infections after cesarean delivery: Epidemiology, prevention and treatment. Mat Health Neonatol Perinatol. 2017;3:1-9.
8. Steiner HL, Strand EA. surgical site infection in gynaecological surgery: Pathophysiology and prevention. Am J Obstet Gynaecol. 2017:217:121-128.
9. Dryden M. Surgical antibiotic prophylaxis. Surgery. 2015;37:19-25.
10. Seligman KM, Kotz D, Farber MK. Preventing surgical site infection after cesarean delivery-The anaesthesia professional's role. APSF New Letter. 2018:25-27.
11. Farooqui HH, Mehta A, Selvaraj S. Outpatient antibiotic prescription rate and pattern in the private sector in india: Evidence from medical audit data. PLoS One. 2019;13:14.
12. Zejnullahu VA, Isjanovska R, Sejfija Z, Zejnullahu VA. Surgical site infections after cesarean sections at the university clinical center of kosovo: rates, microbiological profile and risk factors. BMC Infect Dis. 2019;19(1):1-9.

13. Tilman D, Fargione J, Wolff B, D'antonio C, Dobson A, Howarth R, et al. Forecasting agriculturally driven global environmental change. Science. 2001;292:281-284.
14. Weinberger K, Lumpkin TA. Diversification into horticulture and poverty reduction: A research agenda. World Develop. 35(8): 2007;1464-1480.
15. Zhang M, Meng X, Bhandari B, Fang Z, Chen H. Recent application of modified atmosphere packaging (map) in fresh and fresh-cut foods. Food Rev Int. 2015;31(2):172-193.