SCREENING AND TREATMENT OF ASYMPTOMATIC BACTERIURIA IN PREGNANCY

Thesis

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LIST OF ABRREVIATIONS

AIDs Acquired Immunodeficiency syndrome

ASB Asymptomatic bacteriuria

Bid Twice daily

CFU Colony forming unit

CT Computed Tomography

G6PD Glucose-6-Phosphate Deficiency

GFR Glomerular filtration rate

IVP Intravenous pyelogram

MRI Magnetic Resonance Imaging

ORs Odds Ratios

po Per os

qid Four times daily

tid Three times daily

TMP-SMX Trimethoprim Sulphamethoxazole

UTI Urinary tract infection

WHO World Health Organization

ABSTRACT

Asymptomatic bacteruria in pregnancy is defined as the presence of a significant amount of bacterial growth in a urine culture taken from a urine sampleand the absence of symptoms of urinary infection such as pain or urgency. The aim of this work is to assess the prevalence of asymptomatic bacteruria in pregnant ladies attending Bani-Sueif University Hospitals, obstetrics and gynecology outpatient clinic. All patients were followed up through 2 visits: 1^{st} visit (6^{th}-10^{th} weeks) &2^{nd} visit (22^{nd}-24^{th} weeks).Then follow up visit for 2^{nd} culture after the initial treatment and another course of antibiotic given for those still positive**.**All patients with ASB were classified into 2 groups: Group (1):received single dose antimicrobial agent according to the result of culture and sensitivity test e.g. Amoxicillin-Clavulinic Acid/ Nitrofurantoins/ Cefalexin). Group (2): received multiple doses antimicrobial agents according to the result of culture &sensitivity test for 3 days. Then culture and sensitivity repeated one week after the course of antibiotic is finished and the results of the two groups were compared. All antimicrobials were chosen according to the result of culture &sensitivity with safety of use during pregnancy assured. The antibiotic sensitivity patterns showed that most of the bacterial isolates were sensitive to amox-clav, cephalexin, and nitrofurantoin**.** There are different regimens in treating asymptomatic bacteriuria during pregnancy, of them single day course and three days course.

Key words: Asymptomatic bacteriuria- culture and sensitivity- urinary tract infectioin

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INTRODUCTION

Asymptomatic bacteruria in pregnancy is defined as the presence of a significant amount of bacterial growth in a urine culture taken from a urine sample**(U.S. National Library of Medicine; National Institute of Health,2006)**and the absence of symptoms of a urinary infection such as pain or urgency ***(Sescor et al.,2003)***.

Asymptomatic bacteruria occurs in approximately 2% to 14% of pregnant women and 80,000 to 400,000 cases occur each year in the United States **(Mittal , 2005)**.

Pregnant women are at increased risk for UTI(starting in week 6 through week 24), because of stasis of urine, and the bacteria in the urinary tract from relative obstruction, that is caused by the physiological changes during pregnancy that predispose women to bacteruria. These physiological changes include the dilatation of the ureters secondary to progesterone, and to the mechanical obstruction from the gravid uterus later in pregnancy. Glycosuria, proteinuria, and aminoaciduria were found in pregnancy, also facilitate bacterial growth**(Jones, 2009).**

Without treatment, 20% to 40% of asymptomatic bacteruria cases among pregnant women progress to pyelonephritis, a serious kidney infection. Pyelonephritis complicates 1% to 2% of all pregnancies and affects 100,000 women each year **(Mittal,2005).**It is also a leading cause of antepartum hospitalization. With appropriate screening and treatment, only 3% of bacteruria cases will progress to pyelonephritis**(Mittal, 2005)**.

Also it increases the risk for preterm delivery and low birth weight and may also increase the risk of fetal and perinatal mortality **(Calogne, 2004).** In fact, the risk of pretermdelivery is twice as high among women who had asymptomatic bacteruria atsome point during pregnancy compared to those who did not**(Mittal, 2005).**Prevalence of asymptomatic bacteriuria (ASB) in those with premature uterine contractions and others with no history of uterine contractions were 23.5% and 16.9% respectively. A highly significant association between ASB of the mothers and preterm labor was noted**(El-SokkaryM ,2011)**.

Risk factors for asymptomatic bacteruria during pregnancy include low socioeconomic status, urinary tract infections (UTIs) in childhood. Other risk factors include preexisting medical conditions such as diabetes, sickle cell disease,immunosuppression (e.g., HIV/AIDS), urinary tract anatomic anomalies, and spinal cord injuries. UTIs experienced before pregnancy are predictive of the diagnosis of asymptomatic bacteruria at the first prenatal visit **(Mittal,2005)**.

Esherichia coli is the most common cause of urinary tract infection, causing eighty to ninety percent of cases. It originates from fecal flora that colonize the periuretheralarea (ascending infection). Klebsiella, Enterobacter and Proteus species cause most of the remaining cases. Gram-positive organisms, particulary Enterococcus faecalis and group B streptococcus,are also important pathogens.Infection with staphylococcus saprophyticus,an aggressive community acquiredorganism can present with upper urinary tract disease and the infection is more likely to be persistent or recurrent **(Viller et al.,2000).**

Clinical trials demonstrated important reduction in many of adverse effects by proper screening and treatment by antibiotics as amoxicillin,cephoperazone and nitrofuratoin**(Krcmery etal., 2001).**

ANATOMICAL CHANGES OF THE URINARY TRACT DURING PREGNANCY

1- KIDNEY CHANGES

Information about renal anatomy during normal pregnancy is limited, but it appears that thekidney becomes larger.Autopsystudiesareobviouslyscarce, but inoneuniqueandlargeseries**(Sheehan , 1973)**combinedkidney weights ofnormotensivewomendyingduringor shortly aftergestationwerehigherthannormalvalues for nonpregnantindividuals.However,detailsabout the causeofdeath,whichcouldhaveaffectedkidney weights, werelimited.Renalweightalsoincreasesdur- ing pregnancyinrats,theevidencesuggestingthat is duetoincreasedwatercontent,asrenaldryweights are similaringravidandnonpregnantrats.**(Baylis , 1994)** .In one study inwhichrenalbiopsyspecimenswere obtainedfromnormalgravidas(usuallyduringcesarean section),thelightmicroscopicappearancewas describedassimilartothatinnonpregnantsubjects **(Lindheimer, 1985).** Butdatafrombothautopsy material and renal biopsiesperformedinthelasttrimesteron12Normalgravidassuggestedthatglo merularsize,but not numberofcells,maybeincreasedinpregnant women**(Strevens et al., 2003).**Detaileddescriptionsofthekidneysof normal pregnantwomenoranimalsusingelectron microscopicorimmunofluorescencetechniquesare not available. Starting inthefirsttrimester,overallrenal dimensions length,width,and thickness increaseand peak duringthethirdtrimesterat1cmabove prepreg nant values

(Cietak &Newton ,1985). Thesechanges,documentedbyultrasonographyandpyelography,translateintoanoverall increase inrenalvolumeof 50% bytheendof pregnancy**(Cietak &Newton ,1985)**.Bothrenalparenchymaland pelvicalycealvolumesenlarge,althoughthelatter typicallybeginstorisesomewhatlaterduringthe second trimester.Renalparenchymalvolumeenlarges most likelyduetoincreasesinbothvascularand interstitialfluidvolume,thereislittleevidenceforcellular hyperplasiaorhypertrophy**(Lindheimer ,1985).**Renal sizeandvolume estimatedbyultrasonographyorpyelographyinthe immediatepuerperiumarealsoincreased**(Cietak &Newton , 1985).**

Of interest,roentgenogramsperformedshortlyafterdelivery and repeatedsixmonthslaterdemonstratedthatrenal lengthhaddecreased by 1 cmbetweenthetwoexams ***(Lindheimer& Katz , 1985*)**.Thewell-documenteddilationoftheupper ureter,renalpelvis,majorandminorcalyces, whichaffectsthevastmajorityofgravidasatterm,is particularlyprevalentontherightside**(Conrad ,1992).**Consequently,urinarystasisandhydronephrosis (either withorwithoutcalycealclubbing)arecommon physiologicaloccurrencesinhumanpregnancy**(Cietak &Newton,1985)**andusuallydonotreflectpathologic obstruction.Althoughthemoreseveresignsofthis physiologicalobstructionresolveatleastby6weeks after delivery,evidenceforurinarystasispersistsin manywomenat12weekspostpartum.

2- THE UERTER

The causesoftheureteraldilationarecontroversial. Both humoralchangesandmechanicalobstruction have beenimplicated.Smoothmusclerelaxationoccurs in severalorgansduringpregnancy,andsomeauthors reportedureteraldilationinnonpregnanthumansand animals administeredestrogen _progestinderivatives ***(Lindheimer &Katz ,1985)***Ureteral dilationmayoccurinprimateswithplacentas that secretehormonesbutabsentfetuses**(Lindheimer&Katz ,1985)**and ultrasonographyshowsthattheureterdilatesbeforethe uterus hasenlargedsufficientlytocauseobstruction**(Cietak&Newton ,1985)** noristhedilationrelievedbyprolonged catheterization**(Lindheimer&Katz , 1985)**The obstructivetheoryissupportedbytheobservations ofmarkedexacerbationofintraureteralpressure when thirdtrimestergravidaswereinasupineor standingposition,andsignificantameliorationupon removal oftheobstructiveinfluenceofthegravid uterus byplacingthesubjectinthelateraldecubitusor knee -chest position,orbycesareandeliveryofthe fetus**(Rubi& Sala ,1968).**Moreover,theincreasedpressurewasnoted only abovethepelvicbrim**(Mattingly&Borkowf ,1978)**Thesedataare supported bytheelegantstudiesofDure-Smith**(Dure-Smith ,1970)**who combined in vivo and postmortemobservationsand concludedthatureteraldilationstopsatthelevelofthe true bonypelvicbrimwheretheuretercrossestheiliac artery (Figure2). Atthatjunction,onemayseea pyelographicfillingdefect,calledthe“iliacsign” Althoughcompelling,thedataarenot conclusive,becauseWaldeyer’ssheath,aconnectivetissue

envelopingtheuretersastheyenterthetrue pelvis,hypertrophiesduringpregnancyandcould restrict hormone-induceddilatationbelowthepelvic brim. A relatedtheoryisthatdilationoftheovarianand uterineveins(especiallythoseontheright)during pregnancyobstructstheureters**(Rasmussen& Nielsen**,**1988)**.The "ovarian vein syndrome"(ureteralcolicascribedtoobstruction secondarytoenlargementoftheovarianvein)was describedinapatienttakingoralcontraceptives, an observationthatcombinesthehumoralandobstructive theories. Also supportingobstructionasacauseofthe physiologicaldilationistheoccurrenceof an"overdistention" syndromeinlategestation**(Fainaru et al .,2002).**This clinical entity causedbyexaggeratedureteraldilation is characterized bymarkedhydronephrosis,abdominalpain, increasesinserumcreatinine,andinsomecases, hypertension**(Satin et al.,1993)**Some ofthesepatientswere successfullymanagedwithureteralstents,whichwere removedpostpartumwithout recurrenceofsignsand symptoms**(Sonnenberg et al., 1992).**

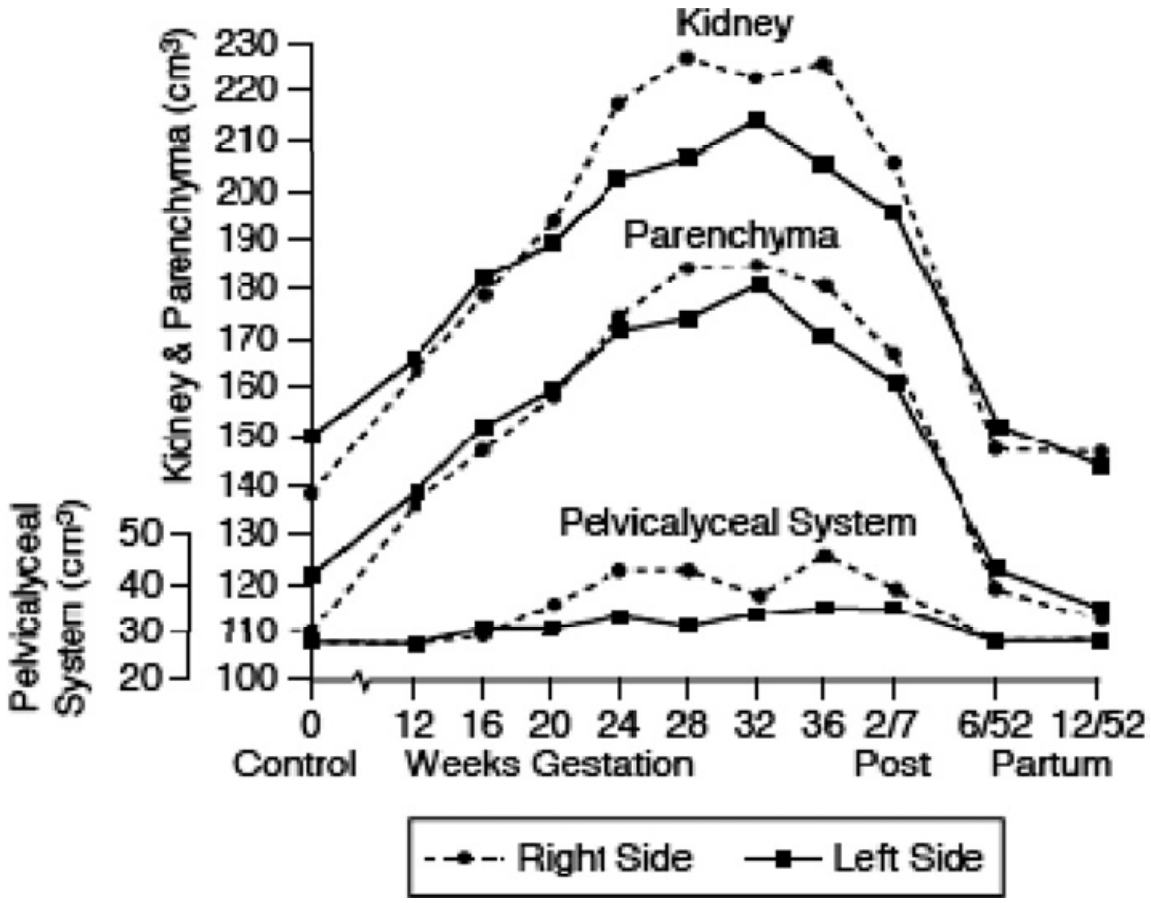

Figure (1) :Quantitative determinationbynephrosonography of totalrenalandpelvicalycealvolumes,aswellasthecalculated dif ference ofthetwo,parenchymalvolume,in34primigravidwomen throughout pregnancyandinthepostpartumperiod.Thevolumes were calculatedbytheellipsoidformula,volume=length xwidthx thickness x0.5233.2/7,6/52,and12/52designateday2,andweeks6 and 12postpartum,respectively**(Cietak&Newton,1985)**.