Review Article

Trabeculectomy in pregnancy: Case studies and literature review

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Glaucoma management during pregnancy is a challenge for the patient and doctor. During pregnancy, the intraocular pressure (IOP) decreases. However, some women with preexisting glaucoma have elevated IOP requiring enhanced medical treatment. Glaucoma refractory to medical treatment combined with disease progression may necessitate laser trabeculoplasty or surgical intervention. Surgery during pregnancy has potential risks for both the mother and fetus. The challenges include problems with anesthesia, positioning for surgery, difficulties in the surgical procedure, potential risk with antimetabolites, and concerns with the management of postoperative complications. We report two case scenarios that highlight the challenges associated with trabeculectomy in pregnant women and the modifications that can be adopted to improve safety and the efficacy of glaucoma filtering surgery during pregnancy.

Key words: Glaucoma in pregnancy, glaucoma surgery in pregnancy, pregnancy and glaucoma medications, trabeculectomy in pregnancy

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While glaucoma is common among the elderly population, it can also affect women of childbearing age. In a Japanese study, the prevalence of open-angle glaucoma ranged from 0.42–0.73% among women aged 15–44 years.[1] Glaucoma in pregnant women is likely to increase with the growing tendency to start families late and with advances in medical and obstetric care ensuring safe birth in older women.[2] In general, pregnant women have preexisting glaucoma from childhood (i.e., congenital glaucoma or anterior segment dysgenesis, developmental glaucoma), juvenile glaucoma, glaucoma secondary to uveitis, diabetes, etc.[3] Although intraocular pressure (IOP) is known to reduce during pregnancy,[4-6] in some cases it can increase, necessitating enhanced medical, laser, or surgical intervention.[2,3]

Literature paucity due to ethical and legal constraints on conducting clinical trials on pregnant women leaves us with no evidence-based guidelines for glaucoma management during pregnancy. In a questionnaire survey administered to ophthalmologists, Vaideanu and Fraser[7] reported a general level of uncertainty in managing glaucoma in pregnant women; only 26% ophthalmologists treated pregnant women and 31% were unsure of handling these cases.[8] The current article discusses special requirements for pregnant women in the medical management of glaucoma, laser therapy, and surgical intervention.

Medical Management

According to the US Food and Drug Administration (FDA), antiglaucoma medications (AGMs) are considered unsafe in pregnancy. FDA classifies glaucoma medications based on the safety profile of the drug,[3]

- Category A medications have strong evidence of safety, based on human studies
- Category B medications have varying and/or contradictory human and animal data. For example, a drug is graded as Class B if animal studies showed some harm but human studies indicated safety, or if animal studies indicated safety but no human studies were available. Category B includes alpha-agonists[3]
- Category C describes medicines which produce side effects in animal models or with inadequate animal or human studies. It includes drugs like topical beta-blockers, prostaglandin analogs (PGAs), topical and oral carbonic anhydrase inhibitors (CAIs), and parasympathomimetics[3]
- Category D medications indicate human studies establishing a risk to the fetus
- Category X drugs show strong evidence of birth defects.

Drug drainage through the nasolacrimal duct, lack of ocular metabolism, and bypassing hepatic enzymatic metabolism causes systemic absorption of drugs[9] exposes the fetus to the side effects of AGM.[2,3] Simple techniques such as punctal occlusion and eyelid closure can reduce systemic absorption.[3] Medical management requires a fine balance between the risk of vision loss to mother and side effects of AGMs on fetus.[3] Hence, pregnant women should be prescribed minimum medications as indicated.

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Laser Therapy

Argon laser trabeculoplasty (ALT) and selective laser trabeculoplasty (SLT) are useful alternatives to reduce the number or need for AGMs and possibly defer surgery.[10,11] However, the inability to perform laser trabeculoplasty in dysgenetic angles, lower efficacy in young patients, delayed onset of IOP reduction,[2,3] and compromised long-term IOP control are some limitations.[12] There is scant literature on the use of micropulse or diode cyclophotocoagulation to control IOP during pregnancy.[13] Given the short time frame of pregnancy, trabeculoplasty should be considered whenever feasible.[2,3]

Glaucoma Surgery

During pregnancy, surgery is best avoided, however, IOP can increase and preexisting glaucoma can worsen despite medical and laser treatment.[2,14] Brauner *et al*. found IOP elevation in close to one-third of the pregnant women with glaucoma (10/28 eyes). While half of them had stable visual fields (5/28), the others (5/28) had visual field progression.[15] The failure of conservative management combined with disease progression makes surgical intervention inevitable.[3,8] Glaucoma surgery during pregnancy has serious risks. Challenges related to preoperative planning, anesthetic concerns, intraoperative modifications, and postoperative management are discussed in this article.

We describe two cases with glaucoma during pregnancy requiring surgical management.

Case 1

A 15-year-old girl with a strong family history of glaucoma was diagnosed with ocular hypertension (IOP 34 mmHg) in both eyes and was started on topical AGMs (timolol maleate 0.5% and latanoprost 0.005%) elsewhere. On her first visit to our center, her visual acuity was 20/20, N6 in both eyes (OU); anterior segment was normal; IOP was 10 mmHg with central corneal thickness (CCT) of 562 µ OU. Gonioscopy showed open angles with prominent iris processes; fundus showed a medium-sized disc with 0.4 cup-to-disc ratio (CDR) and healthy neuroretinal rim. Visual fields on Humphrey's perimeter were normal. She was continued on the same medications and followed up biannually for IOP estimation and annually for visual field testing. Her IOP was well controlled with topical medications in both eyes and visual fields were normal over a 9-year follow-up.

Subsequently, during a scheduled visit, an increased IOP of 32 mmHg OU was noted. She was compliant with medications, and no cause could be identified. However, she revealed that she was 4 months (17 weeks, early second trimester) into her first pregnancy. She was using timolol maleate and latanoprost eye drops. After consulting the treating obstetrician, the AGMs were augmented (pilocarpine hydrochloride 1% and brinzolamide 1% eye drops, and oral acetazolamide 125 mg thrice a day); punctal occlusion and eyelid closure were advised. The IOP was controlled for a short period but fluctuated significantly over the next 3 months. The family opted for medical treatment to control IOP until her delivery; hence, IOP was monitored every 2 weeks. During her 31st week of pregnancy, the IOP increased to 48 mmHg in OU despite topical and oral AGMs. The optic disc progressed to 0.7 CDR with an inferior notch with correlating visual field progression (from normal to superior arcuate scotoma) in both eyes [Fig. 1a and b]. In view of the rapid progression and uncontrolled IOP, she was advised trabeculectomy after explaining the risks involved with anesthesia and surgery. Although laser trabeculoplasty was a possibility, it was not opted considering the rapid progression and need for immediate control of IOP. She underwent fornix-based trabeculectomy without antimetabolites in the right eye (OD). Low volume peribulbar anesthesia supplemented with subconjunctival preservative-free lignocaine was used. Her obstetrician monitored the vitals and fetal heart rate during the surgery. Arrangements were made to handle any emergency. She was given oral acetazolamide 500 mg preoperatively instead of intravenous mannitol. Left lateral positioning was adopted, and the head was positioned straight supported by two pillows under the mid and lower back. The surgery was completed in the shortest duration possible. Intraoperatively, a fornix-based conjunctival flap with wide-area conjunctival dissection was performed, and a triangular 4 × 4 mm scleral flap was made. No intraoperative antimetabolites were used. Preplaced sutures were applied before the deep block excision to facilitate quick scleral flap closure and prevent hypotony. Three 10-0 nylon sutures (Ethilon; Ethicon Inc., Somerville, NJ) were used, one to the apex and one on either side of the scleral flap. Handling the conjunctival tissue was a challenge as it was edematous with increased vascularity. Three wing sutures were used to close the conjunctiva with 8-0 Vicryl on a round-bodied needle (Ethilon; Ethicon Inc., Somerville, NJ). Following surgery, the IOP decreased to 10 mmHg with diffuse bleb in OD. At 1 week postoperatively, a low flow leak was noted, which resolved with a 15 mm silicone bandage contact lens for 2 weeks. Meanwhile, she underwent a limbal-based trabeculectomy in the left eye. Similar precautions were taken and the conjunctiva was closed meticulously with 8-0 Vicryl. However, after 1 week there was a small gape with minimal leak at the suture line, and one 10-0 nylon suture was applied under topical anesthesia. At 1-month follow-up (36 weeks of pregnancy), IOP was 10 mmHg with diffuse bleb in both the eyes. She delivered a healthy child with an Apgar score of 10. She remained stable and had a second child 2 years following trabeculectomy. IOP was under control throughout the second pregnancy. At the 5-year postsurgery follow-up, OU showed diffuse blebs [Fig. 1c], and IOP was 14 mmHg with stable visual fields.

Case 2

A 25-year-old woman presented with a history of blurred vision in OU. Her father was blind due to glaucoma. Visual acuity was 20/20 and N6 in OU. Anterior segment was normal, fundus examination showed 0.6 CDR with a healthy neuroretinal rim in OU. IOP was 38 mmHg with open angles on gonioscopy in OU. CCT was 536 µ in OD and 545 µ in OS. Humphrey's visual fields were normal in both eyes. She was started on topical latanoprost 0.005% eye drops. On subsequent follow-ups, timolol maleate 0.5% and dorzolamide 2% eye drops were added to control elevated IOP, which was maintained at 14 mmHg in OU. She was advised follow-up every 4–6 months. However, she was lost to follow-up for 18 months and presented with 28 mmHg IOP in OD; the fundus showed 0.75 CDR with inferior notch

and corresponding superior arcuate scotoma on visual fields. The IOP was under control in OS with three topical medications, and disc was healthy with normal visual field. In view of high IOP in OD, two additional topical AGMs (brimonidine tartrate 0.15% and pilocarpine hydrochloride 2%) and oral acetazolamide were prescribed. Despite maximum medications, the IOP remained high at 31 mmHg, and she underwent trabeculectomy with MMC under local anesthesia in OD. Postoperatively, topical steroids for 4 weeks, cycloplegic for 2 weeks, and topical antibiotics for 1 week were prescribed. Post surgery, IOP reduced to 10 mmHg with a diffuse bleb. However, 1 month postoperatively, bleb showed moderate vascularity and scarring with IOP of 24 mmHg. Bleb needling with MMC was performed which stabilized the IOP to lower teens without any additional glaucoma medications in OD. After marriage, she was irregular with her medications and follow-up despite repeated counseling. Six months later at 11 weeks of pregnancy, the IOP in OS was 32 mmHg and disc showed progression with 0.7 CDR and inferior notch with corresponding visual field defect. Topical pilocarpine hydrochloride 2% was added with punctal occlusion and eyelid closure. Oral acetazolamide was not considered, and she was advised to stop latanoprost eye drops. However, she opted to continue with medications and defer any further intervention. In her second trimester (16th week), oral acetazolamide was added in consultation with her obstetrician. Despite maximum medications, high IOP (38 mmHg) persisted with significant disc and field progression [Fig. 2a and b]. Surgery was planned in OS at 24 weeks of pregnancy. The OS trabeculectomy was augmented with Ologen implant (Aeon Astron Europe B.V. Leiden, Netherlands) considering early postoperative bleb scarring in her right eye and Mitomycin-C (MMC) being contraindicated during pregnancy.(15) She underwent OS fornix-based trabeculectomy with Ologen implant (6 × 2 mm) under minimal peribulbar anesthesia supplemented with subconjunctival lignocaine. Left lateral positioning was

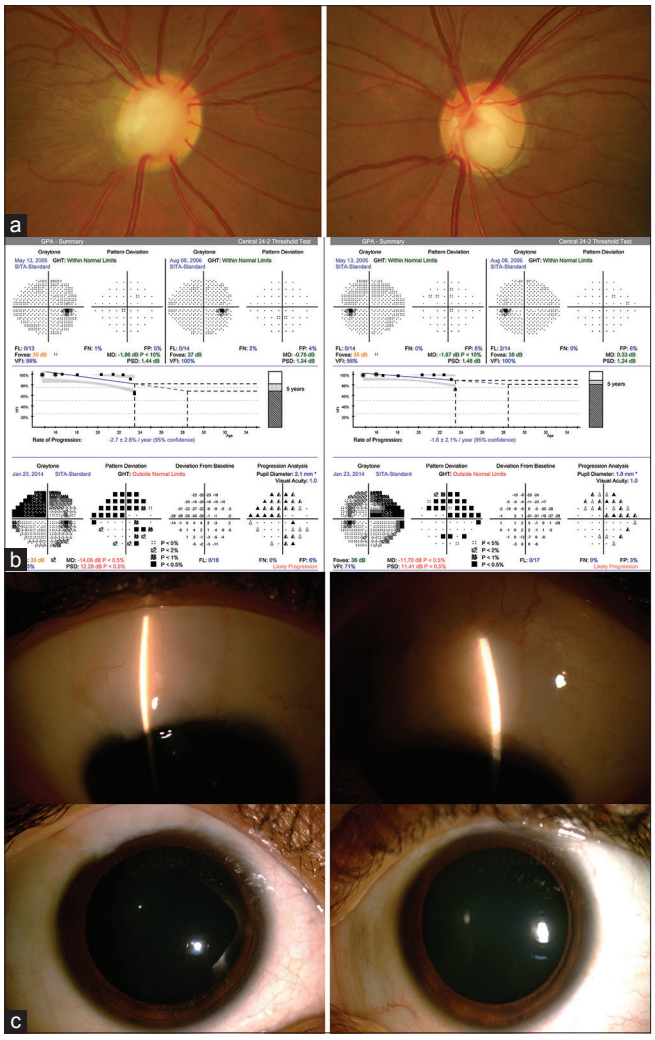

Figure 1: (a) Color fundus photographs showing medium-sized disc in both eyes, with 0.8 CDR, inferior rim thinning and pallor, and 0.8 CDR with inferior notch and diffuse NFL loss inferiorly in left eye. (b) Glaucoma progression analysis (GPA) indicates progression from normal visual fields to superior arcuate scotoma in both eyes. (c) The anterior segment photographs showing diffuse bleb superiorly with pharmacologically dilated pupils and well-formed anterior chamber in both eyes

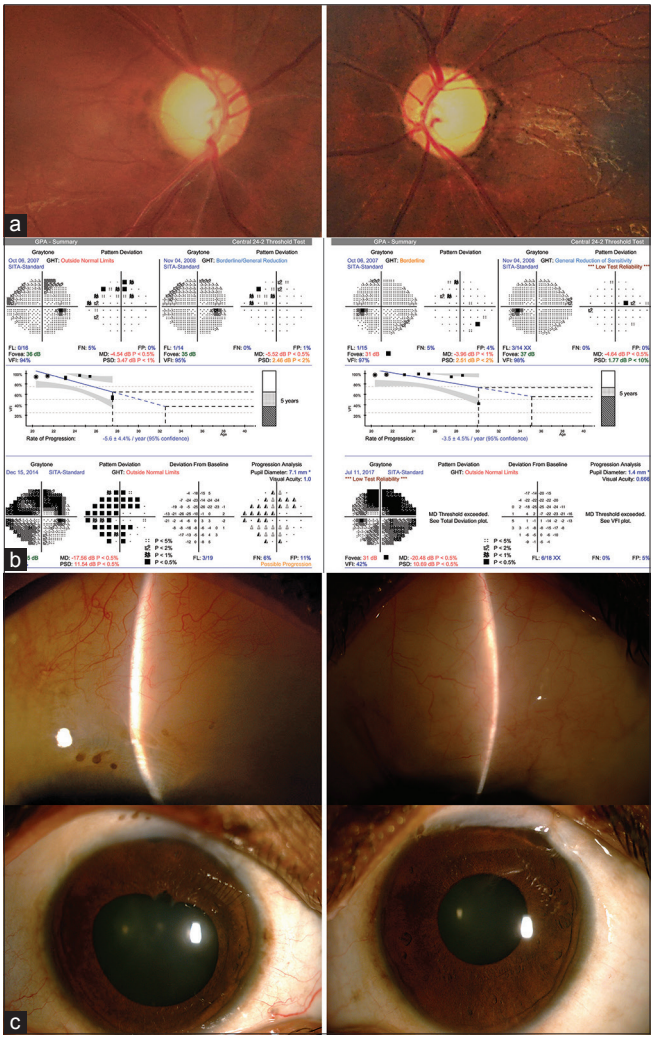

Figure 2: (a) Color fundus photographs of right eye showing 0.8 CDR with inferior notch and NFL thinning in inferior and superior quadrants. Left eye disc shows 0.9 CDR, bipolar notch, and diffuse NFL loss. (b) Visual fields showing progression from normal to biarcuate scotoma scotoma in both eyes. (c) Anterior segment photos show diffuse bleb superiorly and pharmacologically dilated pupil in both eyes with posterior synechiae at 12 o'clock position in right eye

adopted, and vitals were monitored during surgery. Slow paracentesis and preplaced sutures helped to prevent sudden hypotony. Postoperative recovery was uneventful with IOP at 10 mmHg in OS. The IOP was well controlled in OU for the rest of her pregnancy, and she delivered a healthy child. At the 8-month postsurgery visit, IOP was 16 mmHg in OD and 10 mmHg in OS with good bleb [Fig. 2c] and stable visual fields in both eyes.

Discussion

Managing glaucoma in pregnancy poses several challenges. IOP reduces in a linear fashion as pregnancy advances.[4,16] However, close to one-third of the women have elevated IOP,[15] and it may worsen in women with preexisting glaucoma needing additional medical treatment or surgery. While medical treatment is challenging, surgery has serious concerns and risks related to anesthesia, the use of adjunctive antimetabolites, and intra and postoperative complications. When surgery is mandatory, the surgeon should be aware of the risks involved for the mother and fetus and take appropriate precautions to improve the safety and efficacy of the procedure.

Medical treatment

AGMs have potential side effects at various stages of pregnancy. The risks include teratogenicity in the first trimester; premature labor in the second and third trimester; and breast milk toxicity due to drug secretion during postpartum and lactation. Each class of medications has its own concerns for usage during pregnancy and lactation.[3]

Beta-blockers

Timolol is shown to cross the placenta and cause fetal bradycardia and cardiac arrhythmia.[3] However, systemic beta-blockers are used to treat hypertension during pregnancy.[17] While oral beta-blockers are classified as category C drugs, no specific categorization is available for topical medications.[3] Topical beta-blockers are commonly used to treat glaucoma during pregnancy without significant side effects. The use of beta-blockers during lactation is controversial as it causes neonatal respiratory distress and apnea due to secretions into breast milk.[3]

Alpha-agonists

Brimonidine is a category B medication. Although well-tolerated, it should be discontinued close to labor and during lactation as it can cause central nervous system depression and apnea in infants.[3]

Prostaglandins analogues

PGAs are category C drugs associated with miscarriages in animal studies.[3] They can stimulate uterine contraction producing preterm labor. However, it is unclear whether ophthalmic dosage can induce this side effect.[3] Given this theoretical risk of premature labor, PGAs are not used as first-line medication during pregnancy.

Carbonic anhydrase inhibitors

Topical medications are classified under category C. Animal studies show that both brinzolamide and dorzolamide cause teratogenicity and low birth weight.[3] While a majority of drugs would be considered unsafe with possible teratogenic or harmful effects during pregnancy, there is no convincing evidence for the adverse effect of acetazolamide in pregnancy. These medications should be used with caution when the possible benefit to the mother outweighs theoretical risk to the fetus. While the liberal use of acetazolamide should be avoided during pregnancy, it should remain a treatment option when clinically indicated.[18,19] However, in early pregnancy of fewer than 13 weeks of gestation, we do not recommend using oral CAIs. Nonetheless, in the second and third trimester, CAIs could be used with caution, explaining the risk (not clearly known) versus the benefit of controlling IOP and preventing loss of field and vision. The use of oral CAI in late pregnancy needs close monitoring as it can cause neonatal electrolyte imbalance and metabolic acidosis. Drug secretion into breast milk is not established; hence, it can be used while managing glaucoma in lactating mothers with caution while monitoring the neonate.[2,3,20]

Cholinergics

Pilocarpine is not commonly used in young patients as it is not very well tolerated. There is no known association between the use of topical pilocarpine and congenital abnormalities; however, it is safer to avoid it during the postpartum and lactation period as a few instances of hyperthermia and seizures in neonates were recorded.[3,20]

Based on available evidence, the different classes of AGMs that can be used in each trimester of pregnancy are given in Table 1.

Newer drugs with additive neuroprotective effects have been approved for treating glaucoma. Rho-associated protein kinase (ROCK) inhibitors modify the aqueous humor outflow by decreasing the resistance in conventional pathway. When used systemically, ROCK inhibitors may also cause excessive vasodepressor action. Although the topical use of these medications minimizes adverse effects, there are concerns about the effects of long-term usage and tolerance to the drug.[21,22] We do not have any experience and there are no studies on the use of these medications in pregnant women. None of the clinical trials have proved ROCK inhibitors to be superior to the commonly used AGMs or drug interactions with them.[22] Hence, ROCK inhibitors were not considered to manage IOP in these patients.

Table 1: Recommended class of AGMs according to the trimester of pregnancy*

	First trimester	Second trimester	Late pregnancy and lactation
First line of drug	Brimonidine	Brimonidine	Pilocarpine Brinzolamide
Second line of drug	Brinzolamide Timolol maleate	Brinzolamide Timolol maleate PGAs Pilocarpine Oral CAIs	PGAs Timolol maleate Oral CAIs
Avoid	Oral CAIs PGAs Pilocarpine		Brimonidine

*FDA classification of glaucoma medications based on the safety profile of the available drugs: Category B: Alpha-agonists. Category C: Topical beta-blockers, PGAs, topical and oral CAIs, and parasympathomimetics/miotics. # to be used with caution: may rarely cause neonatal electrolyte imbalance and metabolic acidosis; however, acetazolamide is approved by the American Academy of Pediatrics for use during nursing, AGM=Antiglaucoma medications, CAI=carbonic anhydrase inhibitors, PGA=Prostaglandin analogues

While most drugs have potential side effects, it is necessary to weigh the benefits and risks before using them.

Laser therapy

Laser trabeculoplasty may be a reasonable alternative or additive to glaucoma medications, either before or during pregnancy, despite its disadvantages such as delayed onset of action, less effective in younger patients and compromised long-term IOP control.[2,3] Both ALT and SLT are effective in young patients to decrease the IOP.[10,11] We acknowledge the limitation of not using SLT in these two patients; it is possible that when planned and performed during early pregnancy, it could have alleviated the need for surgery. Cyclophotocoagulation was also not considered due to delayed onset of laser effects, inconsistent results, and possible need for repeat procedure.[13]

Anesthetic concerns

Altered maternal physiology predisposes pregnant women to hypoxia, hypercapnia, and systemic hypotension, which exposes both mother and fetus to the risk of anesthesia, more so general anesthesia.[3] Additional challenges include difficult airway management because of gastroesophageal reflux and increased risk of aspiration. Placental transfer of anesthetic agents such as narcotics, paralyzing agents, and inhalational agents can cause fetal cardiovascular and central nervous system depression.[14] There are no well-controlled human studies on the teratogenic effects;[20,23] however, reports show an increased incidence of low birth weight and neural tube defects with exposure to general anesthesia in the first trimester.[24] Local anesthetics used in current ophthalmic surgeries have not shown teratogenic effects in humans and are considered relatively safe in pregnancy.[8] However, fetal bradycardia was noted with bupivacaine but not with lidocaine.[25] Topical anesthesia augmented with subconjunctival and anterior sub-Tenon's anesthesia causes less systemic absorption of anesthetic drugs;[26] hence, it is advisable to limit the drugs to minimum required dose for effective analgesia.

Preoperative preparations

The first step is to decide a safe and effective surgical procedure. Trabeculectomy is considered the best choice; however, given the excessive scarring in young patients and contraindication to adjunctive antiscarring agents, valved glaucoma drainage devices are good alternatives to treat refractory glaucoma in pregnant women.[8] Based on our experience in treating young (nonpregnant) patients with glaucoma, trabeculectomy without antimetabolites has good intermediate outcomes,[27] although it may scar in the long term. It controls IOP immediately and is less expensive.

Considering simultaneous bilateral versus unilateral surgery is worth mentioning. Bilateral surgery is preferable as anesthesia concerns and surgical positioning become more challenging with increasing gestation.[3] This may also decrease the frequency of postoperative visits. However, it may not be ethical to perform bilateral simultaneous intraocular surgery, especially on a pregnant woman. Further, based on the response to the first surgery, we could plan the second eye surgery. It is important to discuss the medical and surgical plan with the treating obstetrician and anesthesiologist to ensure the safety of both the mother and fetus. The need to secure intravenous access and maintain good hydration status cannot be overemphasized.

Intraoperative considerations

Supine position in the second and third trimester can cause profound systemic hypotension as the gravid uterus tends to compress the aorta and vena cava. It is advisable to rotate patients' hip, abdomen, and thighs to the left lateral position while maintaining a normal head position for surgery. As chances of gastroesophageal reflux are high, full stomach should be avoided during surgery.[3,8] Although intraoperative fetal heart rate monitoring might be ideal, it might not be mandatory as the duration of surgery is short.[3] It is advisable to defer surgery till the second trimester to prevent potential hazards of teratogenic anesthetic agents on the fetus.[28] However, the risk of surgery increases substantially as the fetus grows in the second and third trimester.[3]

Antimetabolite use

Although no studies report the teratogenic effects of MMC on the human fetus, the drug action mechanism strongly suggests a potential hazard of teratogenicity.[3] Intravenous use of 5-fluorouracil can lead to congenital anomalies but the risk of subconjunctival application is not known.[3,29] Hence, it is safer to avoid antimetabolites during pregnancy.[28] However, a high risk of bleb scarring in young age with additional risk of trabeculectomy failure due to prolonged use of topical AGMs may necessitate the use of wound modulating agents during trabeculectomy. Using biodegradable, implantable, porous collagen matrix (Ologen) subconjunctivally could be an option to modulate wound healing and prevent subconjunctival fibrosis. This collagen implant acts as a scaffold for the fibroblast growth and prevents scarring. It also acts as a reservoir and aids in mechanically separating the conjunctiva and episcleral tissue to prevent adhesion and subconjunctival fibrosis.[30] Studies evaluating the outcomes of trabeculectomy with MMC and Ologen were comparable,[30,31] or had better IOP control in MMC group however with more avascular blebs.[32] Ologen implant and MMC were equally efficacious over a long follow-up of 5 years.[33] Theoretically, Ologen implant is a potential substitute to the antifibrotics, but to date there are no reports on using Ologen implant in glaucoma surgery during pregnancy.

The presence of tissue edema, possibly due to hormonal changes, makes scleral and conjunctival suturing difficult. This is likely to affect postoperative tissue healing and bleb morphology. Releasable sutures can be placed for controlled filtration and IOP management in the postoperative period. In case 1, despite meticulous suturing, the friable and edematous tissue probably predisposed to bleb leak. We did not encounter this in case 2, where the surgery was performed in the second trimester. This is likely to happen as the pregnancy advances. Hence, closer postoperative follow-up is needed, and, if there is a leak, a soft bandage contact lens can promote wound healing.[34]

Antibiotics

Topical antibiotics are used judiciously in the postoperative period.

A human study on fluoroquinolones, a category C drug, shows no risk of congenital anomalies.[23] However, there is insufficient data on its usage in humans.[3] Erythromycin, a category B drug, has poor ability to cross the human placental

barrier and has no reported congenital anomalies; hence, it may be considered in the care of pregnant women.[3,20,23] Category D drugs, like tetracyclines and aminoglycosides, are considered unsafe in pregnancy. We used topical moxifloxacin eye drops four times a day for 1 week. In the eye that needed BCL, topical antibiotic was continued for 2 more weeks until the lens was removed.

Steroids

Topical corticosteroids are the routine postoperative medications following glaucoma surgery. Given the strong tendency to use steroids and the absence of clear complications associated with topical steroids, they can be used in pregnant women.[3] All systemic glucocorticoids can cross the placenta. Prednisolone and methylprednisolone cross the placenta less than betamethasone and dexamethasone and may have less effect on the fetus. Studies have shown absent fetal teratogenicity with oral steroids.[28] However, oral steroids should be used cautiously.[3] We used topical prednisolone acetate every 4–6 h in tapering doses over 4–6 weeks.

Cycloplegics

Homatropine hydrochloride 2% eye drops and atropine sulfate 1% eye drops can be used as the ophthalmic dosage of these drugs is less likely to affect the fetus. However, homatropine might be a better option, as atropine can cause fetal bradycardia.[23] We used homatropine eye drops twice daily for 2 weeks.

All topical medications should be prescribed with punctal occlusion and eyelid closure to reduce systemic absorption. Patients should be advised to avoid blinking immediately after the instillation of eye drops as blinking can activate the lacrimal pump and increase systemic absorption.[3,25] However, utmost care and caution should be exercised during punctal occlusion in the early postoperative period, avoiding additional pressure on the eyeball and taking appropriate hygienic precautions.

Conclusion

Elevated IOP management during pregnancy varies based on the trimester of pregnancy, the severity of the disease, and risk versus benefit of treatment. Though IOP is known to decrease during pregnancy, some patients develop uncontrolled IOP not amenable to medical treatment. A subset of such patients shows high disc and field progression, where glaucoma surgery is warranted. Anesthesia and surgical intervention pose risk to both mother and fetus. It might be safer to perform glaucoma surgery in the second trimester to reduce the anesthesia-related risk of defective organogenesis and risk of termination of pregnancy in the first trimester. Surgery in the third trimester should be avoided because of difficulties with positioning, anesthesia, premature labor, fetal distress, and difficult tissue handling and healing. The chances of surgical failure in pregnant women may be high due to young age and contraindicated antimetabolite usage. Trabeculectomy with Ologen implant may be a safer alternative to modulate wound healing in pregnant women.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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