

The Management of ToRCH Cataract Congenital

Ariel Kevin Kekelengenta Ginting ^{a*}, Indri Wahyuni ^a, Mahendra Arif Tri Sampurna^b

* ariel.kevin.kekelengenta-2020@fk.unair.ac.id

^a Faculty of Medicine Universitas Airlangga, Surabaya

^a Department of ophthalmology Faculty of Medicine Universitas Airlangga, RSUD Dr. Soetomo Surabaya

^b Department of pediatric, Faculty of Medicine Universitas Airlangga, RSUD Dr. Soetomo Surabaya

Abstract

Introduction: Congenital Cataract caused by ToRCH is a serious eye illness which we can see as a unilateral or bilateral turbidity of lens which caused by complex pathogen which can end as a blindness. We aim to analyze the good ToRCH cataract congenital management, especially in embryonic period.

Methods: This was a systematic review study. Journal were gathered from a number of database, such as PubMed, Research Gate, Google Scholar, Science Direct and international university publication such as SAGE Journal and NHS. All of the used journal are free access and published in 2010 – 2022. The dependent variable which conclude in this study is a patient with ToRCH congenital cataract and the the early diagnose which given to the patient.

Results: This study found the similarity in the early detection management of prenatal period, however there was 1 early detection management which disagree to do a early detection in prenatal period and emphasize to do a early detection only in postnatal period.

Conclusion: There are similarity and significant difference in every early detection management, however before the early detection management can be use in Indonesia, there are some review needed because every early detection management has a difference level of effectivity in prenatal, perinatal, and postnatal period.

Keywords : Congenital cataract, ToRCH, Early detection

Introduction

Congenital Cataract is a serious eye illness in shape of unilateral or billateral turbidity of the lens which caused by the complex pathogen and can occurs a blindness. Congenital cataract is also become the main target of the World Health Organization program called VISION 2020 : The Right to Sight, which has intention to eliminate the numbers of blindness in 2020. Congenital cataract reported to has the highest prevalence in asia, with 7.34 of 10.000 birth.¹ Meanwhile, in Indonesia, there were 224 pediatric cataract patient with 94.64% of them are congenital cataract and the others 5.36% are developmental cataract.²

There are some factors which can cause a congenital cataract, one of them is ToRCH, which consist of Toxoplasmosis, Rubella infection, Herpes Simplex infection, Cytomegalovirus infection, and some other agent such as Hepatitis, Human Immunodeficiency Virus (HIV), and Parvovirus.

In middle-east asia, there were 60 patient of congenital cataract, 29 of them were positif of *Toxoplasma*

gondii, Rubella virus, Cytomegalovirus, and Herpes Simplex virus with the result of lab test were 35% positive IgG CMV, 21.7% positive Rubella IgG, 13.3% positive Toxoplasma IgG, and 8.3% positive HSV IgG.³

One of the treatment that can be done is a cataract surgery. However, the cataract surgery is not enough to overcome the congenital cataract. Cataract surgery is the beginning of the treatment, because after the surgery, there will be other procedure that need to be done such as aphakia glasses usage and occlusion therapy using eye patch.⁴

However, the management of TORCH congenital cataract is still rare to be done. Based on Indonesia Health Ministry Regulation (Permenkes), there are some health services which don't get any government assurance, one of them is TORCH. Furthermore, minor participant of healthcare workers in management of TORCH congenital cataract also become one of the reason.

Methods

This research using a literature review method based on evidence based in journal conducted from 2010 to 2022. Journal searching were carried out using database search engine such as PubMed, Science Direct, and Google Scholar with the keywords are "Congenital Cataract", "TORCH", "Early Detection", and "Guideline". The inclusion criteria are the journal are based on observational study, clinical trial, case control report, and RCTs. Meanwhile the exclusion criteria are the literature which don't fulfill the inclusion criteria, uncomplete data, and no TORCH congenital cataract patient in the journal. The journals were assessed using CASP Checklist and the data are extracted in table.

Data Analysis

The data collected from this study were analyzed using a CASP Checklist, whereas the assessment is modified to get the quantity and quality assessment.⁵

Results

Based on journal research in database which mention before, there are 445 of journal found using the keywords, which are (congenital cataract) AND (Torch) AND (guideline). 445 journal which found were strained with the inclusion criteria and there are 40 journal which included. Based on the 40 journal which already strained with the inclusion criteria, there are 26 journal which excluded, therefore there are 14 journal left which can be used in this research. Those 14 journal were studied and there are 2 literature with the same title, 5 literature which the subject weren't only the ToRCH congenital cataract patient, and 2 literature have subjects which the patient aren't diagnosed as a ToRCH congenital cataract. At the end, there are 5 literature which reviewed in this Systematic Review. The literature are assessed with CASP (Critical Appraisal Skills Program) analysis table and using a modified criteria to assess the literature qualitatively (Table 1). Afterward, the data in literatures are extracted in to the table based on the each ToRCH check up in every literature (Table 2, 3, 4, 5, 6). The data are also extracted based on the ToRCH check up time, which are prenatal, perinatal, and postnatal. There are some difference TORCH management in 5 literature which compared. The management by Lee et al (2012) has complete examination in every period. In prenatal period, there are complete blood test, ToRCH titer test, echocardiogram and metabolic test disorder.⁶ In perinatal period, there is USG examination to inspect the fetus. In postnatal period, there is no examination, but they suggest to give the cataract operation immediately.⁶ Leung et al (2020) don't has a perinatal period examination.⁷ However, this management has a complete examination for every ToRCH, such as Toxoplasma specific IgG and IgM maternal serum, fetus USG, rubella – specific IgG, CMV DNA PCR from amnion fluid, and PCR swab from vesicle for HSV.⁷ Meanwhile in postnatal period, there are toxoplasma IgG, IgM, and IgA in cerebrospinal fluid, specific-rubella IgM through plasental blood, CMV isolation from baby's urine, and HSV PCR from perifer specimen.⁷ Congenital cataract management by Lu and Yang (2014) only emphasize to do a laboratory examination only in postnatal period, which are anti-TOX IgG, IgM RV, anti-CMV, and HSV 1 and HSV 2 antibody.⁸ Thayalan et al (2020) has a complete management in every period. In prenatal period, there are anamnesis which emphasize the family history and other history such as radiation exposure and maternal infection, subsequently there are laboratory check up such as rubella IgG and PCR.⁹ In perinatal period, there is a USG screening to observe the patient eye, and if the cataract USG result is positive, it will continue with supporting examination such as fetal echocardiogram and fetal MRI.⁹ This management also do the examination in postnatal period, there are general inspection which continued by anterior vicerotomy and primary posterior capsulotomy surgery which planned in first 4 months of baby life.⁹ Meanwhile, the management by Mahalaksmi et al (2010) has some examination such as USG, amniocentesis, fetal blood

sampling, and non-specific IgA and IgM in prenatal period and doing the laboratory examination such as specific Toxoplasma IgA, IgM RV, anti-HSV 1 and anti-HSV 2, and anti-CMV in postnatal period.¹⁰

Table 1. CASP Checklist (Modified criteria) for quality and quantity assessment

	1	2	3	4	5	6	7	8	9	10	Journal Quality
Lee et al (2012)	Y	Y	Y	Y	Y	Prioritize the USG in Prenatal period	Quite Accurate	Y	Y	Y	High
Leung et al (2020)	Y	Y	Y	Y	Y	The prenatal diagnose are better using Laboratorium check such as IgG-RV	Quite Accurate	?	Y	Y	High
Lu and Yang (2016)	Y	Y	?	Y	?	Best diagnose are in postnatal period	Quite Accurate	?	Y	Y	Intermediate
Thayalan et al (2020)	Y	Y	Y	Y	?	Anamnesis and supporting examination are enough	Quite Accurate	Y	Y	Y	High
Mahalakshmi et al (2010)	Y	Y	Y	Y	?	Prioritize the USG, amniosintesis and foetal blood sampling.	Quite Accurate	Y	?	Y	High

Table 2. Toxoplasma management comparison

	Prenatal	Perinatal	Postnatal
Lee et al (2012)	-	<ul style="list-style-type: none"> USG to see the patient's eyes abnormality 	-
Leung et al (2020)	<ul style="list-style-type: none"> Non-treponema essay Treponema essay as confirmation 	-	<ul style="list-style-type: none"> Lesion or body fluid examination in darkfield microscope
Lu and Yang (2016)	-	-	-
Thayalan et al (2020)	<ul style="list-style-type: none"> Anamnesis (family history, radiation exposure, and maternal infection) 	<ul style="list-style-type: none"> Cataract screening using USG If the USG result (+), continued with supportive examination such as fetal MRI and echocardiogram 	-
Mahalakshmi et al (2010)	-	-	-

	Prenatal	Perinatal	Postnatal
Lee et al (2012)	<ul style="list-style-type: none"> ToRCH titer test 	<ul style="list-style-type: none"> USG to evaluate abnormality in patient's eye 	-
Leung et al (2020)	<ul style="list-style-type: none"> Toxoplasma specific IgG and IgM maternal serum 	-	<ul style="list-style-type: none"> Toxoplasma IgG, IgM, and IgA on CSF
Lu and Yang (2016)	-	-	<ul style="list-style-type: none"> Anti-TOX IgG
Thayalan et al (2020)	-	<ul style="list-style-type: none"> Cataract screening using USG If the USG result (+), continued with supportive examination such as fetal MRI and echocardiogram 	-
Mahalakshmi et al (2010)	<ul style="list-style-type: none"> Non-specific IgA and IgM 	-	<ul style="list-style-type: none"> IgA for Toxoplasma gondii and recommended using lens aspiration

Table 4. Rubella management comparison

	Prenatal	Perinatal	Postnatal
Lee et al (2012)	<ul style="list-style-type: none"> Complete blood test ToRCH titer test Echocardiogram Test metabolic disorder 	<ul style="list-style-type: none"> USG to see the patient's eyes abnormality 	
Leung et al (2020)	<ul style="list-style-type: none"> Rubella-Specific IgG 		<ul style="list-style-type: none"> Specific IgM Rubella
Lu and Yang (2016)	<ul style="list-style-type: none"> 		<ul style="list-style-type: none"> IgM RV laboratorium check
Thayalan et al (2020)	<ul style="list-style-type: none"> IgG rubella and PCR 	<ul style="list-style-type: none"> Cataract screening using USG If the USG result (+), continued with supportive examination such as fetal MRI and echocardiogram 	
Mahalakshmi et al (2010)	<ul style="list-style-type: none"> Non-specific IgA and IgM 		<ul style="list-style-type: none"> IgM RV

Table 5. Cytomegalovirus management comparison

	Prenatal	Perinatal	Postnatal
Lee et al (2012)	<ul style="list-style-type: none"> • Complete blood test • ToRCH titer test • Echocardiogram • Test metabolic disorder 	<ul style="list-style-type: none"> • USG to see the patient's eyes abnormality 	<ul style="list-style-type: none"> •
Leung et al (2020)	<ul style="list-style-type: none"> • CMV DNA PCR from amnion liquid 		<ul style="list-style-type: none"> • PCR HSV from peripher specimen
Lu and Yang (2016)			<ul style="list-style-type: none"> • Antibody HSV 1 and HSV 2
Thayalan et al (2020)	<ul style="list-style-type: none"> • Anamnesis (family history, radiation exposure, and maternal infection) 	<ul style="list-style-type: none"> • Cataract screening using USG • If the USG result (+), continued with supportive examination such as fetal MRI and echocardiogram 	
Mahalakshmi et al (2010)	<ul style="list-style-type: none"> • Non-specific IgA and IgM 		<ul style="list-style-type: none"> • Anti-CMV

Table 6. Herpes simplex virus management comparison

	Prenatal	Perinatal	Postnatal
Lee et al (2012)	<ul style="list-style-type: none"> • Complete blood test • ToRCH titer test • Echocardiogram • Test metabolic disorder 	<ul style="list-style-type: none"> • USG to see the patient's eyes abnormality 	-
Leung et al (2020)	<ul style="list-style-type: none"> • PCR swab from vesicle to check the HSV 	-	<ul style="list-style-type: none"> • PCR HSV from peripheral specimen such as nasopharing and mouth
Lu and Yang (2016)	-	-	<ul style="list-style-type: none"> • Anti-CMV
Thayalan et al (2020)	<ul style="list-style-type: none"> • Anamnesis (family history, radiation exposure, and maternal infection) 	<ul style="list-style-type: none"> • Cataract screening using USG • If the USG result (+), continued with supportive examination such as fetal MRI and echocardiogram 	-
Mahalakshmi et al (2010)	<ul style="list-style-type: none"> • Non-specific IgA and IgM 	-	<ul style="list-style-type: none"> • Anti-HSV 1 and 2 IgM

Discussion

Based on the management which compared above, there are four management which do the early detection in prenatal period, except for the Lu and Yang's management which only emphasize to do only a early detection in postnatal period. Meanwhile, in perinatal periode, there are only two management which have an early detection examination and all of the management have a postnatal early detection examination.

Based on the management which compared above, also there are some significant difference in each early detection examination which suggested by every management which compared. In prenatal period, Lee et al (2012) suggest a general examination by using ToRCH titer test, complete blood count test, and echocardiogram.⁶ Leung et al (2020) suggest to do a laboratory check up, such as toxoplasma IgG and IgM, fetal USG, specific rubella IgG, PCR DNA CMV from amnion liquid, and PCR swab from HSV vesicle.⁷ Thayalan et al (2020) suggest to do an anamnesis to search a history about the pasien, such as history of radiation exposure and family history, then continued with laboratory check up, which are IgG rubella and PCR.⁹ This management only emphasize in rubella because based on the preceding case, there are two of three pasien which has a congenital cataract caused by rubella. Meanwhile Mahalakshmi et al (2010) suggest to do a non-specific IgA and IgM test and also do the USG, amniocentesis, and fetal blood sampling.

In every ToRCH examination, there are gold standard that can be used as a standard to do an examination. Toxoplasma has a gold standard examination which is PCR to detect DNA parasite of toxoplasma.¹¹ Rubella early detection gold standard examination is virus genome detection through amnion liquid or fetal blood.¹² Cytomegalovirus has some examination as the gold standar, which are maternal screening, whereas it involved the mother's antibody using a IgM antibody.¹³ However, IgM antibody only occurs in first several months, therefore the check supported by IgG antibody test to analyze the infection time.¹⁴ The other examination involve the fetal with amniocentesis for PCR with or without viral culture.¹⁵ Herpes simplex early detection only emphasized in postnatal period.¹⁶

Perinatal period examination only suggested in management by Lee et al (2012) and Thayalan et al (2020). There are slightly difference between each examination in both management. Lee et al (2012) suggest to do a screening using USG to see the fetal eye's abnormality. Meanwhile, Thayalan et al (2020) suggest to do a supportive examination by using fetal MRI and fetal echocardiogram. Based on latest research, there is still a few screening which can be done in perinatal period, as example USG, which also used in Australia to screening a rubella disease.¹⁷ However, USG still has a few research which support the USG usage because of unknown sensitivity and specificity.¹⁸

All of the five management which compared do the postnatal period examination. However, there are significant difference in every management. Lee et al (2012) and Thayalan et al (2020) suggest to do the cataract surgery as soon as possible to optimize the result of the early detection.^{6,9} Thayalan et al (2020) has a specific type of surgery, there are anterior vitrectomy and primary posterior capsulotomy in first 4 months of the patient.⁹ Meanwhile, the other management still do the various laboratory check up. Leung et al (2020) suggest to do a laboratory screening such as toxoplasma IgG, IgM, and IgA from cerebrospinal fluid (CSF), rubella-specific IgM through the placenta blood or baby plasma serum under 6 month, CMV from infant urine's serum, and HSV PCR from peripher specimen.⁷ Lu and Yang (2016) suggest to do laboratory check up such as anti-TOX IgG, IgM RV. Anti-CMV, and HSV 1 and HSV 2 antibody.⁸ Mahalaksmi et al (2010) suggest to do IgA on toxoplasmosa which suggest to use lens aspiration, IgM RV, HSV 1 and HSV 2 antibody IgM, and anti-CMV.⁹

The other aspect which observed from the management is the output of the ToRCH congenital cataract early detection management. Based on the management which compared above, there are only two management which do the follow up the output to the patient, which are Lee et al (2012) and Thayalan et al (2020)

Lee et al (2012) suggest to do the unilateral cataract surgery in first 6 months of the baby and bilateral cataract surgery in first 10 months, which give the good result.⁶ Meanwhile, Thayalan et al (2020) more suggest to do the cataract intervention surgery in first 4 months of life which followed with anterior vitrectomy and primer posterior capsulotomy which have a good output after the surgery.⁹

Cataract surgery will give the better result maximal in 2 years, which followed with other treatment to strengthen the patient's visus such as contact lens.¹⁹ Other research emphasize that surgery can be done since the first week of life if it's possible.²⁰

Strength and Limitations

The strength of this study was this study can be reference to make a precise and effective ToRCH congenital cataract management in Indonesia with environment adaptation. The limitations were this study was not able to give a specific data of accuracy and effectiveness of every treatment which exist in each management compared.

Conclusion

Based on the results, it can be concluded that every period has it own gold standard to detect each kinds of ToRCH and from the management which compared above, the management by Leung et al (2020) has a most specific examination in every aspect of ToRCH. Moreover, the management which compared above can be apply in Indonesia with under the review of some aspect such as available resource and tools, by keeping trying the gold standard examination.

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Conflict of Interest

The authors declared there is no conflict of interest.

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Authors' Contributions

Designed the study and drafted the manuscript: AG, IW, and MS. Collected data and performed background systematic review: AG. Performed analysis: AG Supervised results and discussion: IW and MA. All authors reviewed and approved the final version of the manuscript.

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