

# Screening of Retinopathy of Prematurity (ROP)

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## SUMMARY

Retinopathy of prematurity (ROP) is abnormal blood vessel development in the retina of the eye in a premature infant that potentially leads to blindness. The guidelines present the timing of initial examination and subsequent reexamination intervals for screening and treating ROP.

**Key words:** retinopathy of prematurity, screening, timing of the examination

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*Adapted according to the recommendations of the American Academy of Pediatrics 2013 (3)*

A very important role in the result of treatment of retinopathy of prematurity (ROP) is played by effective screening and correct timing of the surgical intervention. Since the implementation of the results of ETROP into practice, the prognosis of ROP treatment has improved substantially, and now only a very small number of eyes reach an anatomically adverse condition on the retina. The screening programme is focused on timely identification of the threshold and posterior forms of pre-threshold stage of retinopathy of prematurity.

1. All infants born before week 32 of gestation (g.w.) with a birth weight (b.w.) of less than 1 500 g are routinely examined, as well as selected infants with a birth weight of 1 500 – 2 000 g or with a gestation age of more than g.w. 32 in the case of an unstable clinical condition, upon occurrence of risk factors (perinatal affliction of the lungs and cardiovascular system, prolonged oxygen therapy, respiratory distress syndrome, chronic lung disease, apnoeic pauses, anaemia and numerous transfusions, sepsis, persistent ductus arteriosus, surgery under general anaesthesia, intraventricular haemorrhages, multiple pregnancy...) according to the indication from the neonatologist, whereas presence of the neonatologist is appropriate during examination of the smallest risk infants, with regard to potential general complications during the examination (apnoeic pauses, bradycardia).
2. The examination should be performed by a trained ophthalmologist with sufficient experience and

knowledge in the identification of the localisation and stage of ROP according to the International Committee for the Classification of Retinopathy of Prematurity (2, 4, 5).

3. The examination is conducted under topical anaesthesia (0.5% Tetracaine gtt, 0.4% Benoxi gtt) by indirect ophthalmoscope with the use of a 28 or 20-dioptre converging lens, on principle with the use of a retractor and a hook for scleral indentation, while during the examination it is necessary to ensure immobilisation of the infant. The examination is performed under maximum mydriasis, it is appropriate to administer mydriatics 3x consecutively at 5-10 minute intervals. A combination of the mydriatics 0.5% Homatropine gtt, 0.5 Unitropic gtt, 2.5% Phenylephrine gtt is appropriate. Upon application of the drops, in particular Phenylephrine gtt, it is necessary to press on the lacrimal punctum in order to reduce systemic absorption of the drugs and the adverse drug reactions thereof (tachycardia, systemic hypertension, paralytic ileus...). To minimise discomfort and pain it is possible to administer one ml of 25% glucose orally 2 minutes before the ophthalmological examination (1).
4. It is important to determine the date of the first examination in order to identify the incipient threshold (pre-threshold) stage of ROP, but at the same time it is necessary to limit unnecessary examinations which represent a burden for premature infants, mainly in the case of an unstable clinical condition. The threshold (pre-threshold) stage of ROP, which is indicated for treatment, develops most frequently in the period between

week 34 and 37 post conception, whereas in very immature infants retinopathy develops later, on average between postnatal weeks 10 and 12, and in more mature children earlier, between postnatal weeks 5 and 7. For this reason we indicate the first examination with regard to the gestation age at birth (Table 1). In general, we first examine infants born before the g.w. 28 in week 31 after conception, and infants born after g.w. 28 within postnatal week 3-4.

5. The dates for subsequent examinations are recommended by the examining ophthalmologist according to the condition of vascularisation and the finding on the retina according to the international classification and the general clinical condition of the infant, in which the next examination is recommended depending on the finding (Table 2).

In the case of presence of the plus (pre-plus) form of the disease in zone I or II, depending on the finding it is necessary to consider rather indication for treatment than further observation. In the case of an equivocal finding, in the presence of pre-plus form, in risk infants with an unstable clinical condition and in the case of a less experienced examiner, it is suitable to indicate examination earlier. Be careful not to forget to examine the infant upon transfer to another department and upon discharging for home care. The date of the next examination must be stated in writing and the parent must be instructed concerning the risk of loss of sight in the case of failure to abide by the date of the examination.

6. Termination of screening examinations of acute retinopathy of prematurity is possible depending on the age and finding on the retina if:

**Table 1** Timing of first eye examination in premature infants – adapted according to the recommendations of the American Academy of Pediatrics 2013 (3).

Gestation age (weeks)	Postnatal age at 1st examination	Post-conception age at 1st examination
22	9	31
23	8	31
24	7	31
25	6	31
26	5	31
27	4	31
28	4	32
29	4	33
30	3	33
31	3	34
32	3	35

Gestation age = duration of pregnancy in weeks, postnatal age = age in weeks from date of birth, post-conception age = gestation age + postnatal age

**Table 2** Timing of follow-up eye examinations for premature infants according to finding on retina

Finding on retina	Localisation - zone	Interval of examinations (week)
Fundus immaturus	Zone I	1 and less
Fundus immaturus	Zone II centre	1 and less
Fundus immaturus	Zone II periphery	1
Fundus immaturus	Zone III	2
ROP stage 1	Zone I	1 and less
ROP stage 1	Zone II	1-2
ROP stage 1	Zone III	2
ROP stage 2	Zone I	1 and less
ROP stage 2	Zone II	1-2
ROP stage 2	Zone III	2
ROP stage 3	Zone II	1 and less
ROP stage 3	Zone III	1

- the retina is completely vascularised into the periphery up to the ora serrata – especially important if ROP has been treated in monotherapy by an anti-VEGF (under physiological circumstances it grows to the ora serrata at around the time of birth, between the g.w. 38-42), or
- upon reaching 50 weeks of post-conception age, if there has not been any previous pre-threshold stage of ROP present, or
- in the case of unequivocal regression of ROP, if there is no presence of abnormal tissue, progression or reactivation of ROP.

7. Treatment of acute retinopathy of prematurity is indicated for high

risk ROP.

**In pre-threshold stage:**

- Zone I: ROP any stage with plus form,
- Zone I: ROP 3 without plus form,
- Zone II: ROP 2 or ROP 3 with plus form.

**In threshold stage of ROP: ROP stage 3** which continuously affects a scope of 5 hours on the clock face or a cumulative scope of 8 hours in zone I or II, with presence of plus form of the disease.

Treatment should be implemented within 72 hours of determination of diagnosis, thus upon stipulating the date for the next examination, if we expect progression of the finding and it shall be necessary to transport the child to a specialised workplace, it is necessa-

ry to reckon with this time.

8. In monotherapy with an intravitreally applied anti-VEGF, regular observation is indicated every week until the end of vascularisation of the retina, with regard to the degree of probability of recurrence of ROP. With regard to the fact that none of the anti-VEGF preparations have yet been approved for use in paediatric practice for the treatment of ROP, and the long-term adverse drug reactions are not precisely known, it is necessary before application to obtain the informed consent of the parent to the administration of off-label therapy (therapy outside of the indication criteria).
9. The results of screening are thoroughly recorded in writing, whereas it is important to ensure communication with the parent, who should be informed about the risks of impairment of sight even despite adequate therapy in the case of the development of a severe type of ROP.
10. With regard to the degree of probability of development of later ocular complications of prematurity (myopia, anisometropia, amblyopia, strabismus, atrophy of ONH...) in children who have been included in screening of ROP, they remain within the care of the ophthalmologist, and it is necessary to inform the patient in this regard. Subsequent ophthalmological observation of premature infants is recommended: Children without ROP and after spontaneous regression of ROP:

1. Examination at around year 1 of corrected age
2. Examination between months 24 to 30
3. Examination before beginning of school attendance

We indicate more frequent examinations depending on the objective finding.

Children following regression of ROP after treatment:

- Every 3 months over the course of 1 year,
- Every 6 months up to the age of 6 or according to the objective finding,
- Long-term care 1x per year, it is necessary to instruct the parent concerning the risk of amotio and self-examination at home.

## LITERATURE

1. Costa, M. C. D., Eckert, G. U., Fortes, B. G. B., et al.: Oral glucose for pain relief during examination for retinopathy of prematurity: a masked randomized clinical trial. Clinics, 68(2); 2013: 199–204.
2. Early Treatment for Retinopathy of Prematurity Cooperative Group: Revised indications for the treatment of retinopathy of prematurity: results of the early treatment for retinopathy of prematurity randomized trial. Arch Ophthalmol, 121(12); 2003: 1684–1694.