No. 314, October 2014 (Replaces No. 261, July 2011)

Prenatal Screening, Diagnosis, and Pregnancy Management of Fetal Neural Tube Defects

This clinical practice guideline has been prepared by the Genetics Committee, reviewed by Family Physician Advisory and Diagnostic Imaging Committees, and approved by the Executive and Council of the Society of Obstetricians and Gynaecologists of Canada.

PRIMARY AUTHOR

R. Douglas Wilson, MD, Calgary AB

SOGC GENETICS COMMITTEE

R. Douglas Wilson (Chair), MD, Calgary AB

Francois Audibert, MD, Montreal QC

Jo-Ann Brock, MD, Halifax NS

Carla Campagnolo, MSc, CCGC, London ON

June Carroll, MD, Toronto ON

Lola Cartier, MSc, CCGC, Montreal QC

David Chitayat, MD, Toronto ON

Alain Gagnon, MD, Vancouver BC

Jo-Ann Johnson, MD, Calgary AB

Sylvie Langlois, MD, Vancouver BC

W. Kim MacDonald, MD, Halifax NS

Lynn Murphy-Kaulbeck, MD, Moncton NB

Nanette Okun, MD, Toronto ON

Melanie Pastuck, RN, Cochrane AB

SPECIAL CONTRIBUTOR

Vanessa Popa, Calgary AB

Key words: prenatal screening, congenital anomalies, neural tube defects, alpha fetoprotein, ultrasound scan, magnetic resonance imaging, amniocentesis, myelomeningocele, spina bifida, anencephaly

Abstract

Objective: To provide obstetrical and genetic health care practitioners with guidelines and recommendations for prenatal screening, diagnosis, and obstetrical management of fetal open and closed neural tube defects (OCNTD).

Options: This review includes prenatal screening and diagnostic techniques currently being used for the detection of OCNTD including maternal serum alpha fetoprotein screening, ultrasound, fetal magnetic resonance imaging, and amniocentesis.

Outcomes: To improve prenatal screening, diagnosis, and obstetrical management of OCNTD while taking into consideration patient care, efficacy, cost, and care procedures.

Evidence: Published literature was retrieved through searches of PubMed or MEDLINE, CINAHL, and The Cochrane Library in November, 2013, using appropriate controlled vocabulary and key words (e.g., prenatal screening, congenital anomalies, neural tube defects, alpha fetoprotein, ultrasound scan, magnetic resonance imaging). Results were restricted to systematic reviews, randomized control trials/controlled clinical trials, and observational studies published in English from 1977 to 2012. Searches were updated on a regular basis and incorporated in the guideline to November 30, 2013. Grey (unpublished) literature was identified through searching the websites of health technology assessment and health technology-related agencies, clinical practice guideline collections, clinical trial registries, and national and international medical specialty societies. An online survey of health care practitioners was also reviewed.

Values: The quality of evidence in this document was rated using the criteria described in the Report of the Canadian Task Force on Preventive Health Care (Table).

Benefits, harms, and costs: This review will provide health care practitioners with a better understanding of the available prenatal screening methods for OCNTD and the benefits and risks associated with each technique to allow evidenced-based decisions on OCNTD screening, diagnosis, and obstetrical management.

J Obstet Gynaecol Can 2014;36(10):927–939

Key to evidence statements and grading of recommendations, using the ranking of the Canadian Task Force on Preventive Health Care

Quality of evidence assessment*	Classification of recommendations†
I: Evidence obtained from at least one properly randomized controlled trial	A. There is good evidence to recommend the clinical preventive action
II-1: Evidence from well-designed controlled trials without randomization	B. There is fair evidence to recommend the clinical preventive action
II-2: Evidence from well-designed cohort (prospective or retrospective) or case–control studies, preferably from more than one centre or research group	C. The existing evidence is conflicting and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making
II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category	D. There is fair evidence to recommend against the clinical preventive action
	E. There is good evidence to recommend against the clinical preventive action
III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees	L. There is insufficient evidence (in quantity or quality) to make a recommendation; however, other factors may influence decision-making

*The quality of evidence reported in these guidelines has been adapted from The Evaluation of Evidence criteria described in the Canadian Task Force on Preventive Health Care.[109]

†Recommendations included in these guidelines have been adapted from the Classification of Recommendations criteria described in the Canadian Task Force on Preventive Health Care.[109]

RECOMMENDATIONS

Screening Evaluation

1. The primary screening test for the detection of fetal structural abnormalities including open/closed neural tube defects (anencephaly, encephalocele, spina bifida) is a second trimester anatomical ultrasound with detailed fetal intracranial and spinal imaging and assessment. (II-2A)
2. The primary use of maternal serum alpha fetoprotein for open/closed neural tube defects screening should be discontinued with the limited clinical exceptions of pregnant women with a pre-pregnant body mass index ≥ 35 kg/m^2 or when geographical or clinical access factors limit timely and good quality ultrasound screening at 18 to 22 weeks' gestation. (II-2A)
3. When used as a component in maternal serum genetic aneuploidy screening, maternal serum alpha fetoprotein can be used as a secondary screening tool in the second trimester. (II-2A)
4. Positive screening results for open/closed neural tube defect (ultrasound ± maternal serum alpha fetoprotein) require timely referral to appropriate experienced providers for genetic review, diagnosis, and counselling. (II-2A)

Diagnostic Evaluation

5. If the second trimester screening fetal ultrasound indicates a probable diagnosis of neural tube defects, the women should be referred to a tertiary or regional centre with ultrasound expertise for a more detailed ultrasound examination looking for the features associated with a neural tube defect sequence. (II-2A)
6. Prenatal magnetic resonance imaging can be considered as an additional fetal imaging technique if further detailed fetal central nervous system assessment is required for diagnostic or management counselling. (II-2A)

Invasive Prenatal Diagnostic Methods

7. The amniotic fluid specimen from a diagnostic amniocentesis (following the ultrasound detection of fetal anomalies including confirmed or suspected open/closed neural tube defect), should be evaluated for a fetal karyotype (and, if indicated and available, a chromosomal microarray), amniotic fluid alpha fetoprotein, and amniotic fluid acetylcholinesterase. These test results will allow comprehensive evaluation of the etiology, estimated risk of recurrence, and prediction of long-term neonatal and childhood outcomes of open/closed neural tube defect for family counselling. (II-2A)
8. When a routine diagnostic amniocentesis indicates only a *risk* of aneuploidy, and no identified fetal anomalies, it is not necessary to take an amniotic fluid specimen or to order amniotic fluid alpha-fetoprotein and acetylcholinesterase testing to screen for open neural tube defects. (II-2E)
9. The diagnostic identification of a pregnancy with an open/closed neural tube defect (isolated or in a more complex multiple-anomaly grouping) requires referral for comprehensive genetic, maternal–fetal medicine, and pediatric neurosurgical counselling for complete patient-focused care. (II-2A)

Pregnancy Management

10. Following the detection of an isolated open/closed neural tube defect, families should be offered a choice of 3 obstetrical care management options after diagnostic and genetic testing results are available. Options should include information about *prenatal* myelomeningocele repair and prognosis (if there are no maternal or fetal contraindications for prenatal repair at 20–26 weeks' gestation), *postnatal* myelomeningocele surgical repair and prognosis, and *pregnancy termination* with autopsy. Because anencephaly is a lethal condition, pregnancy with anencephaly may be interrupted at any gestational age on the woman's request. For an encephalocele, individualized counselling is recommended because of the possibly unique circumstances of the anomaly. (II-2A)
11. Caesarean section is the most common method of delivery for a fetus with a myelomeningocele (MCC) in either vertex or breech presentation, but is it mandatory for breech presentation. Vaginal delivery with intrapartum fetal heart rate monitoring can be considered in selected MMC vertex presentation cases that have no macrocephaly related to gestational age and a small or no MMC sac. (II-2A)