NEUROLOGICAL ILLNESS IN PREGNANCY
PRINCIPLES AND PRACTICE

Edited by
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Neurological illness in pregnancy
Principles and practice
This book is dedicated to Autumn Klein’s daughter, Cianna.
Neurological illness in pregnancy
Principles and practice

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Preface

Dr. Autumn Klein began her education by studying gender and neuroscience at Amherst College where she earned her BA magna cum laude. She went on to obtain a PhD in neuroscience and an MD from Boston University School of Medicine. After an internship in internal medicine at Brown University, she completed her residency in the Harvard Neurology Residency Program at Brigham and Women’s Hospital and Massachusetts General Hospital, where she served as chief resident in her final year.

She completed a fellowship in clinical neurophysiology and epilepsy and then went on to establish the Division of Women’s Neurology at Brigham and Women’s Hospital. She subsequently moved to Pittsburgh where she founded the Division of Women’s Neurology within the Departments of Neurology and Obstetrics at the University of Pittsburgh. From its inception, Dr. Klein served as the chief of this unique subspecialty of neurology. The division served and continues to serve as an interdisciplinary program bridging neurology with obstetrics, gynecology, and women’s medicine. It focuses on gender differences in medical evaluation, diagnosis, and implementation of treatment and care. In addition to the creation of this division, she created an epilepsy monitoring unit for the treatment of pregnant women with epilepsy.

Autumn is fondly remembered for her selfless devotion to the patients for whom she cared. She made herself available for consultation on obstetrical patients 24/7. It was always

Dr. Autumn Klein

The creation of this textbook was initiated by Dr. Autumn Klein, a pioneer of women’s neurology. She developed the format and carefully chose the authors from an elite group of specialists from across the United States and abroad. She unexpectedly passed away on April 17, 2013, before the completion of the book. In her memory, the authors of the book chose to complete the textbook as a legacy to her passion for the field of women’s neurology.
reassuring to have her respond to an unexpected neurologic event. She educated her patients about their neurologic disease and about what to expect during pregnancy and motherhood. She collaborated extensively with obstetricians, anesthesiologists, and epilepsy staff to provide comprehensive patient care. With this first edition of *Neurological Illness in Pregnancy*, we hope that Autumn’s vision will be fulfilled and that it will create a legacy that carries on for generations to come.

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CHAPTER 1

The history and examination

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Introduction

The focus of this chapter will be on the information most helpful to understand, counsel, and treat female neurology patients in their reproductive years. The key elements of the neurologic history and examination will be systematically reviewed with emphasis on gender differences. It will conclude with a few clinical cases. The goal is to enable neurologists to develop the knowledge and skills to maximize care for their female patients with regard to family planning and pregnancy. The objective of this chapter is to help physicians to perform a history and examination that focuses on and identifies the specific family planning concerns of the female patient and how these concerns relate to their neurologic disease.

Many common neurological diseases preferentially affect young women. How we, as neurologists, approach treatment depends on our patients’ needs at that point in her life cycle. This is different for each disease process.

Migraine is a very common disorder with lifetime prevalence in women of up to 25%. Because of hormonal influences, the ratio of affected women over men is 3:1 [1]. The history should include usual triggers, of which menses and ovulation are common. Birth control pills (BCPs) have a variable influence on migraine frequency and in some women may aggravate the disorder [2]. However, many women with menstrual headaches report that cycle suppression (which can be obtained using the subdermal implant, injectable contraception, a pill, patch, or ring) improves their symptoms. The type of migraine is important when discussing contraception. Women with classic migraines should be counseled to avoid estrogen-containing contraceptives (e.g., the pill, patch, or ring), given the increased risk of ischemic stroke. However, common migraine does not preclude use of estrogen-containing contraceptives unless associated with other cerebrovascular risk factors such as an underlying hypercoaguable state. [3] Furthermore, when choosing medications (abortive or prophylactic), you should take into account, whether the woman are trying to get pregnant, or, if not trying to conceive, what birth control they are utilizing. For instance, topiramate in doses above 200 mg/day may reduce the effectiveness of oral contraceptives [4]. Does the patient have regular menses? Could she have polycystic ovarian syndrome? If so, Valproate would not be a good choice as a prophylactic medication [5]. Another concern with patients already predisposed to obesity is that many prophylactic medications can contribute to weight gain.

Multiple sclerosis is another example of a neurologic disease that affects women in their childbearing years [6]. Many of these patients are on an immunomodulatory medication. Interferons are pregnancy class C, copaxone pregnancy class B, and methotrexate a pregnancy class D medication. Because immunomodulatory

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medications are not recommended during pregnancy, birth control should be discussed if the woman is not planning pregnancy. What should we recommend to our patients who would like to become pregnant? They should discontinue their immunomodulatory medication when they discontinue their hormonal or intrauterine contraceptive, as the only contraceptive that typically delays return to fertility is depot medroxyprogesterone acetate. They should be counseled that pregnancy does not worsen overall MS disability. Treatment needs to be appropriately adjusted to best address our patient’s needs at each particular point in her life cycle.

Past medical history

Patients’ medical background allows us to frame a more accurate diagnosis for their current complaints. The disorders from which women suffer are different from those that affect men. A woman’s reproductive desire adds an additional layer of complexity. The medical illnesses more common in women influence which is the most probable neurologic disorder. The following is a brief snapshot of some of the disorders that are more prevalent or occur exclusively in women and how that shapes their care.

The psychiatric problems of depression, anxiety, and borderline personality disorder are more frequent in women. Thus, their neurological problems may be a consequence of somatization, conversion, or have an overlay due to these conditions. These women are at risk for over testing and noncompliance, as well as poor maternal weight gain, poor infant bonding, substance abuse, and postpartum depression. The medications we choose need to take these factors into account.

Autoimmune disorders also affect women more frequently. They may have neurologic complications directly due to their rheumatologic problem, like lupus flares. In addition, their neurologic problem may be due to a result of an underlying hypercoaguable state or as a consequence of their immunosuppressant medications. The recommendations and concerns for these women during pregnancy are highly specialized.

Cardiovascular concerns are important though they are uncommon in premenopausal women. Although estrogen before the menopausal transition is likely protective against cardiovascular disease, we cannot ignore women with a strong family history of vascular disease especially if associated with other risk factors such as tobacco use and migraines. These women do suffer from cardiovascular complications and need advice about risk factor modification. Women with congenital or acquired cardiac disease will need specialized care to appropriately manage the physiologic changes that occur during pregnancy and labor.

An obstetrical and lactation history is extraordinarily important. The number of pregnancies, the gestational stage of the current pregnancy, and the history of either planned or spontaneous abortions predict which obstetrical and neurological diseases are most likely. These factors also determine how, if necessary, to image and what medications are appropriate. For instance, the association with antiphospholipid antibody syndrome and spontaneous miscarriages is well established. A history of eclampsia should be sought. There is good evidence that prior eclampsia predicts eclampsia in future pregnancies as well as increases risk of future maternal hypertension. Other obstetrical issues such as preterm premature rupture of membranes and placenta previa should be asked about directly as these patients are predisposed for recurrence in future pregnancies. A woman with a history of recurrent fetal loss needs an obstetrical referral to help planning/monitoring in future pregnancies.

Bone health is often neglected. The medications we choose should reflect this concern. In addition, many neurologic patients’ disability may limit weight bearing. It is
important to be aware of the effects of medication on bone health; as the long-term use of many medications increase the risk of osteoporosis [22] (see Table 1.1). Examples of commonly used medications that promote bone loss include the anticonvulsants, phenytoin, and carbamazepine. Counseling about the benefits of exercise as well as recommending daily calcium and vitamin D intake is helpful to avoid these complications.

A history of an underlying hypercoaguable disorder is an extremely important historical data in pregnancy planning. During pregnancy there is an increase in factors I, II, VII, VIII, IX, and X as well as a decrease in protein S. The net result is that normal pregnancy is a hypercoaguable state. If a woman has a preexisting hypercoaguable disorder, her chance of having a clotting complication is high and anticoagulation during her pregnancy should be recommended [23].

Surgeries such as those involving the lower spine may make epidural anesthesia more challenging or complicated. For example, a lumbar peritoneal shunt depending on the location may preclude an epidural. Other patients with severe scoliosis, obesity, or lumbar fusion may make neuroaxial anesthesia challenging. A personal or family history of anesthetic complications is an additional historical piece to be obtained. A prior history of postdural headache should be inquired about as this increases a patient risk for recurrence [24]. Anything that would make the patient at risk for anesthesia should warrant an early consult to an obstetrical anesthesiologist.

### Medication considerations

Contraception is a topic that neurologists tend to neglect. It is important to provide patients with recommendations on which contraception options are most appropriate. The most effective contraceptives are the subdermal implant and intrauterine contraceptives, which have been estimated to be 20 times as effective as oral contraceptives and surgical sterilization. There is a myriad of contraceptive choices and they are generally chosen due to personal preference, efficacy, and safety. In our patients, efficacy may be affected by medication interactions (e.g., topiramate) or at times disability. For instance, young women whose disability involves the spinal cord may not be good candidates for certain barrier methods of contraception due to difficulty in positioning or with peroneal sensory loss. In other women, certain types of contraception are contraindicated by safety concerns. For women who have had a stroke, significant cardiovascular risk factors, an underlying hypercoaguable state, and migraine with aura, combined estrogen-containing pills, patch, or ring are not recommended [3]. However, progestin-only methods including the subdermal implant, intrauterine contraceptive, the injectable contraceptive,