



**ANAESTHETIC CONSIDERATIONS FOR CAESAREAN
SECTION IN MULTIPLE SCLEROSIS: A CASE REPORT AND
REVIEW**

¹Raveen Kumar Jayasinghe and ²Anjali Devi Ratnayake

¹Department of Clinical Science, Faculty of Health Care Sciences, Eastern University, Sri Lanka

²Consultant Anaesthetist, Teaching Hospital, Batticaloa

DOI: <https://doi.org/10.5281/zenodo.17077926>

Abstract: A 29-year-old primigravida woman with multiple sclerosis (MS) underwent caesarean section under spinal anaesthesia with the consultation of multidisciplinary team care involving Anaesthetist, Obstetrician, Neonatologist, and Neurologist. The spinal anaesthesia was given following a lengthy discussion with her and her supportive husband. She had neither intraoperative nor immediate postoperative complications because of anaesthesia. No disease relapse or remission occurred in the 6 months postpartum period. We used Pubmed, Medline, and Embase for literature with the aim to improve the management of spinal anaesthesia in patients with multiple sclerosis.

Keywords: Cesarean section, spinal anaesthesia, multiple sclerosis.

INTRODUCTION

MS is a demyelinating condition of the central nervous system (CNS) mainly prevalent and causes neurological disability in young women in their 20-40 years of age in Western countries. It has uncertain aetiology with diverse clinical presentation, therefore, arriving at a diagnosis is difficult [1]. The pathological hallmark of MS is perivascular inflammation and demyelination. Plaques are also other pathological feature of MS which can be demonstrated in the white matter of the CNS, mostly in optic nerves, brainstem, cerebellum, and spinal cord. The clinical symptom correlates with the location of plaque [2].

In Sri Lanka, its exact prevalence rate is uncertain as MS is poorly studied. However, certain studies on MS in the South Asian region, reported its prevalence is considerably low in Sri Lanka, and its clinical picture is also different from other parts of the world [3].

The common symptoms at the onset of disease are optical neuritis (36%), motor symptoms (35%), and sensory symptoms (33%). When the disease progresses, they develop cerebellar features (49%), and sphincter involvement (47%) [4]. However, the presenting clinical features are different in an Asian population. They present with myelitis (33%), optic neuritis (29%), brainstem manifestations (14%), and cerebellar symptoms and

signs (4%). They initially present with lower limb numbness and weakness. Then it progresses to loss of proprioception, difficulty in walking, and sphincter incontinence [5].

The initial presentation of the most (80%) of the MS patients is a relapsing and remitting course and the majority of them develop the secondary progressive phase, during which the neurological deficits progress persistently during remission of relapses [6]. However, a joint Asian study shows that progressive disease is less common in Asia [5].

A descriptive study was conducted on the largest sample of MS patients in Sri Lanka. The main aim of the study was to characterize multiple sclerosis both clinically and para-clinically. It took into consideration of characteristics of magnetic resonance imaging (MRI) features such as oligoclonal band (OCBs) and Aquaporin-4 (AQP4) antibody status. The clinical and para-clinical features were mostly the same as Caucasians patients with MS. However, MRI features of OCB positivity are lower than Caucasian population with MS [3].

This clinical case is on the spinal anaesthetic management of a pregnant woman with MS during caesarean section. We performed a literature study on PubMed, Medline, and Embase to understand the management of MS. The search criteria used were cesarean section, anaesthesia, spinal anaesthesia, and multiple sclerosis. All abstracts were read independently by the authors. The observational studies, case series, and case reports of patients were screened for inclusion. The review of literature is to emphasize the current evidence on the safety of spinal anaesthesia in patients with MS and is aimed at improving the management of spinal anaesthesia, in patients with MS.

2. CASE REPORT

A 29-year-old pregnant woman in her first pregnancy with 35 weeks in gestation was scheduled for an emergency caesarean section (Category 2) at the Teaching Hospital, Batticaloa. This pregnancy was complicated with severe oligohydramnios and intrauterine growth-restricted fetus with an estimated weight of 2.3 kg and amniotic fluid index of 4.8.

One year ago, she had right side eye pain for a week duration and no abnormalities were detected upon ophthalmology assessment and was prescribed steroid eye drops with no improvement. However, her pain responded to non-steroidal anti-inflammatory drugs (NSIAD) in 5 days. One week later, she developed double vision. Therefore, she was subjected to an MRI of brain and spinal cord. The results showed periventricular and corpus callosum demyelinating lesions characteristic for multiple sclerosis (figure-1 & 2) and also found to have multiple demyelinating lesions in multiple levels of the spinal cord at C2, C5, T1, T5, T7, T9 and T12 levels (figure-3).

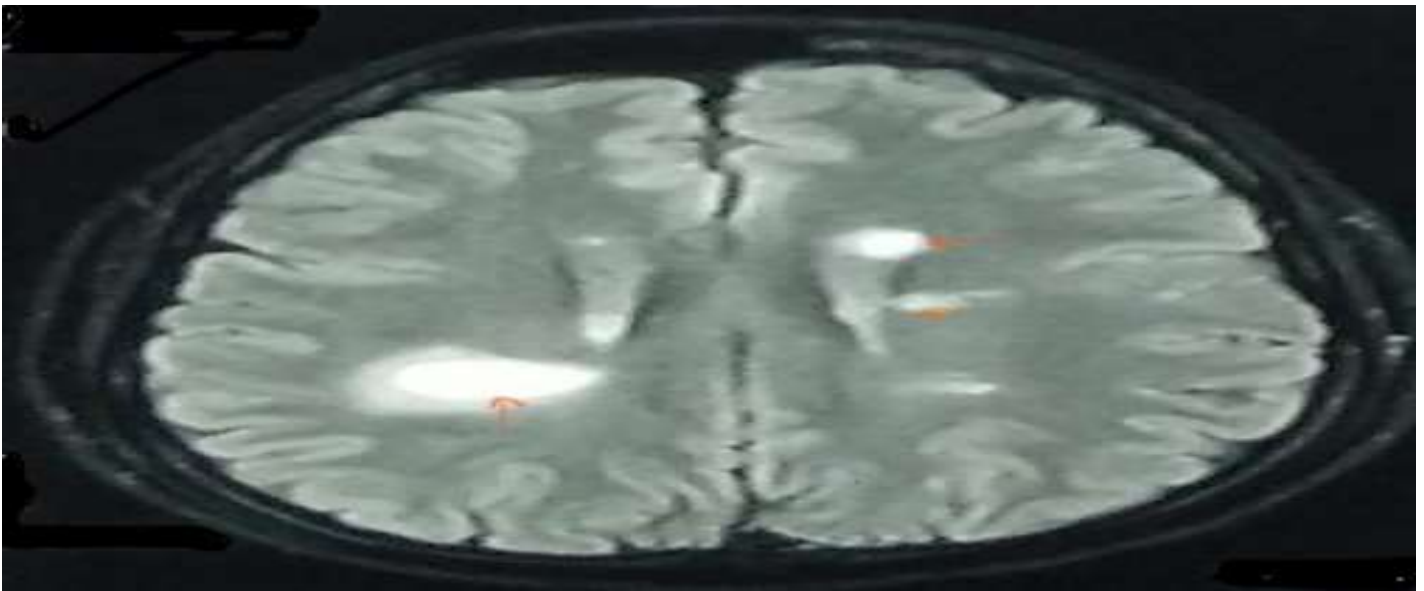


Figure-1: Demyelination lesions in the periventricular areas

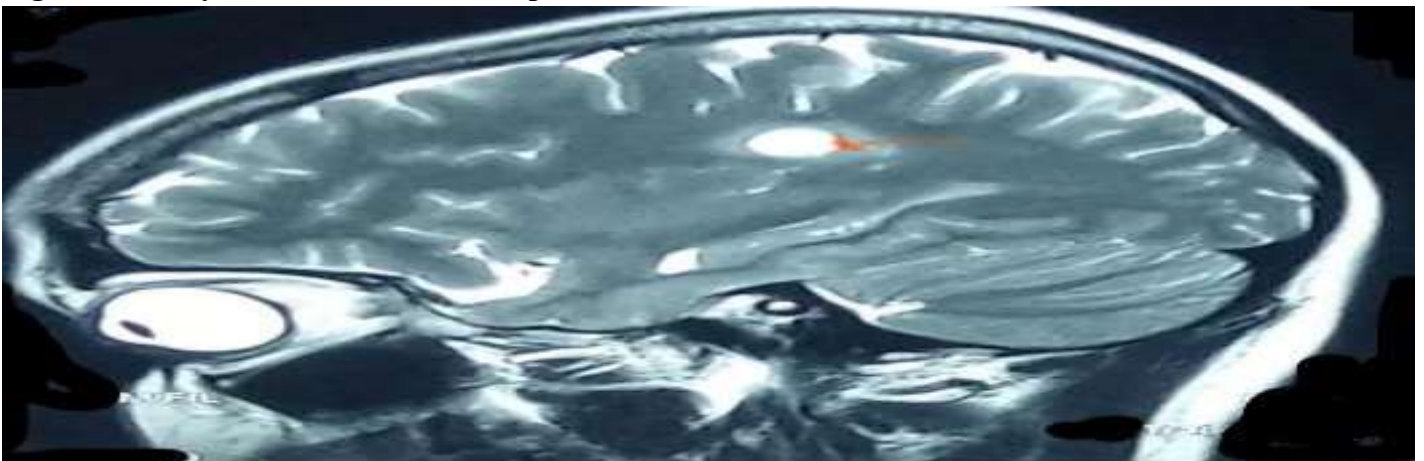


Figure-2: Demyelination lesion in the corpus callosum

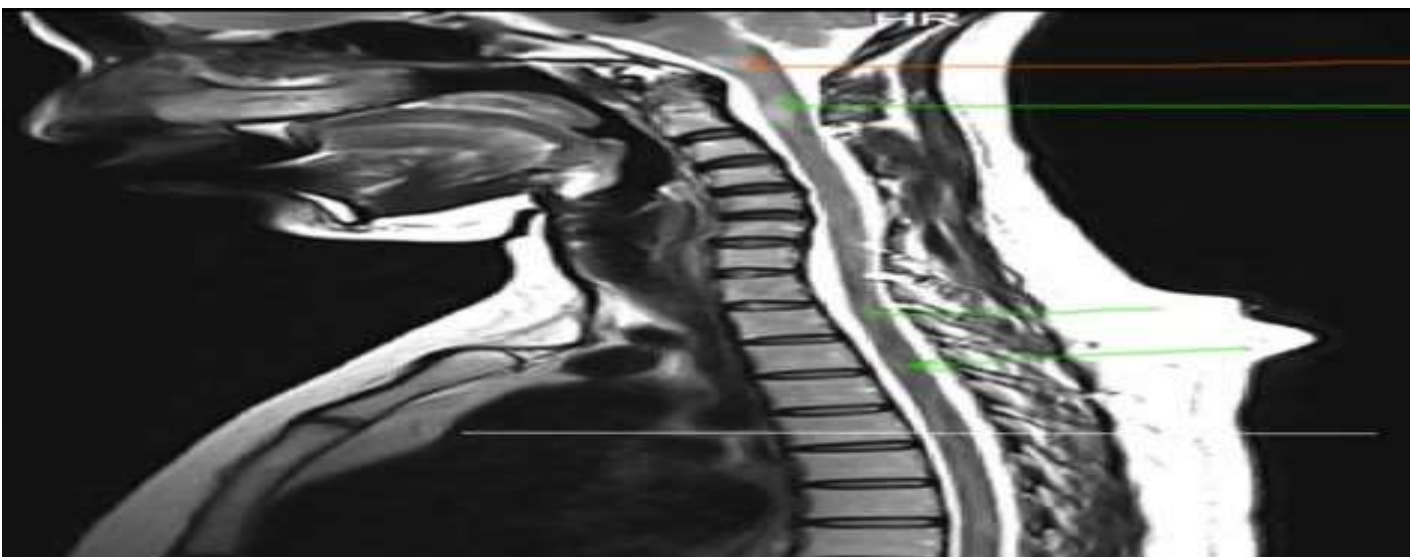


Figure-3: Demyelinating lesions in the multiple level of the spine

She was categorized as relapsing and remitting type of Multiple sclerosis and was treated with pulse therapy of intravenous methylprednisolone for 5 days. One week after commencing the pulse therapy, as she developed faecal incontinence, she was also added a beta interferon subcutaneously 3 doses per week for 8 months. When she had been on treatment, she realized that she was pregnant at 5 weeks.

During the pregnancy, she had only one relapse at 32 weeks of gestation. She developed upper lip numbness for 3 days and left hard palate numbness for the one-day duration and this relapse was treated with a pulse therapy of intravenous methylprednisolone for 3 days with good response.

The preoperative assessment prior to caesarean section showed no other co-morbid conditions. There was no family history of MS. Her general examination was unremarkable. The airway evaluation showed in Mallampati I and the thyromental distance was 6.5 cm. Her cardiovascular system and respiratory system were clinically normal. The neurological examination showed neither motor nor sensory deficit.

The blood investigations showed anaemia. Her Haemoglobin level was 9.6 g/dl; MCV-79fL; MCH- 24pq; MCHC-31.3 q/dl; red cell distribution was 16.7%. It was more suggestive of iron deficiency anaemia. The White Blood Cell and platelet count were within normal range. Renal function, liver function and other septic screening were normal. Her echocardiogram, electrocardiogram and chest x-ray showed normal finding.

Since there were no contraindication, the decision was made to administer spinal anaesthesia with informed consent. The heart rate, blood pressure, oxygen saturation, and ECG were monitored in the operation theatre.

The patient was preloaded with 500 ml of 0.9% sodium chloride. The spinal anaesthesia was administered under strict aseptic precautions with the patient in a sitting position. 2% lidocaine 3ml injected locally at the space between the third and fourth lumbar vertebrae. 0.5% heavy bupivacaine 2.5ml with intrathecal morphine 0.2mg injected intrathecally at 11.17am by single attempt using a 25G pencil point spinal needle with introducer.

Level of spinal anaesthesia was assessed separately for sensory block using cold test and motor block using bromage scale. Sensory block was achieved to T8 dermatome level at 3 minutes on both sides and progressed to T6 dermatome level bilaterally at 4 minutes. Motor block of bromage 3 scale was achieved at 4 minutes.

The caesarean section operative time (skin to skin) was about 35 minutes. The patient had experienced no anaesthetic or surgical complications and her vital parameters such as pulse rate, blood pressure and oxygen saturation were stable throughout the operative session.

We evaluated the intraoperative analgesia using the numerical rating scale (0-10) with a score of 0 during skin incision, lower segment uterine incision, delivery of the fetus, placenta, and membranes. The pain score remained 0 during closure of the uterus in double layer without exteriorization, rectus sheath, subcutaneous layer and subcuticular skin suture. There was no need to administer any additional intraoperative analgesia. She was hemodynamically stable throughout the operative time.

We evaluated post spinal anaesthesia recovery. The sensory level was at T 10 two hours after administration of spinal anesthesia. It reached to T 11 level in another 30 minutes later. Then it was at L1, L2, L3, L4, L5, and S1 level in almost every 15 minutes interval (T 10 at 1.30 pm; T 11 at 2 pm; L1At 2.15 pm; L2 at 2.30pm; L2 at 2.45pm; L3 at 3.pm; L 4 at 3.15pm; L5 at 3.30pm; S1 at 4 pm)

Toe movements appeared three and half hours later (at 2. 45 pm), lower limbs raised against gravity in another half an hour later (at 3. 15 pm). Perineal sensation appeared almost 8 hours later (at 7.30 pm). Therefore, the motor and sensory effect worn off completely in almost 8 hours in this mother.

There were no postoperative complications in this case. The neurological examination performed at 48 hours, 7 days, and 30 days after surgery, did not show either neurological complications or relapse of the disease, MS. Her motor deficit was evaluated in terms of paresis of the lower limbs, upper limbs, and cranial nerves. The sensory

deficit was evaluated with pin- prick perception technique. She was reviewed till 6 months of delivery by a multidisciplinary team and showed no relapse and suggested to continue treatment under the Neurologist team.

3. DISCUSSION

Regional anaesthesia has associated with decreased maternal morbidity and mortality than general anaesthesia for caesarean section [7]. The increased risk of general anaesthesia in the obstetric population could be attributed to a higher probability to encounter a difficult airway, mandatory rapid sequence induction, and the increased risk of aspiration. We should take these risks into an account in the decision-making on the mode of anaesthesia in the obstetric population. Even though data on the use of spinal and general anaesthesia in MS is limited, current expert opinion is that both are safe [8].

The MS shows reduced relapse rate in third trimester of pregnancy and increase in postpartum period before returning to the pre-pregnancy rate. Either the rate of relapse or progression of disability in MS are adversely influenced by lactation or epidural analgesia [9]. The PRIMS study showed a higher risk of postpartum three months relapse of MS in women with greater disease activity in the year before pregnancy and during pregnancy [10]. Therefore, the anesthesiologists prefer general anesthesia in multiple sclerosis with the belief that toxicity of the anaesthetic agents used in epidural or spinal anaesthesia could damage unmyelinated nerve fibers in MS [11]. The double crush theory [12] suggests that unmyelinated neurons are more susceptible to distal denervation following a minor neural event in the affected neural pathway. Therefore, exposure of unmyelinated nerves to local anaesthetics in the cerebrospinal fluid might be neurotoxic [13].

An abnormally high concentration of certain oligopeptide which is found in the cerebrospinal fluid of MS patients can cause partial sodium channel block in unmyelinated axons causing MS symptoms [14]. The structure of local anaesthetics such as lidocaine has structural similarities to the sodium-channel-blocking oligopeptide. These local anaesthetic drugs used in spinal anaesthesia within the intrathecal space, could block sodium channels and increase the amplitude of conduction in silent unmyelinated axons to cause the transient MS symptoms [15]. These effects of neuraxial anaesthetics are transient and reversible and will not cause an aggravation of the underlying condition. This transient effect could have wrongly misinterpreted as spinal anaesthesia with disease exacerbation. Recent studies found no correlation between neuraxial anaesthesia and MS exacerbation [16].

In view of the purported neurotoxic effects of local anaesthetics evidence for spinal anaesthesia is less. In 1990s, several case reports reported the safe administration of spinal anaesthesia for elective caesarean section in a patient with MS [17]. A retrospective study was done at the university hospital Brno from 2004 to 2013. There were 70 deliveries of 65 women with MS, including 45 vaginal deliveries and 25 caesarean deliveries (16 under general anaesthesia, 8 with epidural anaesthesia and one spinal anaesthesia). There was no statistically significant difference in relapses of MS between the vaginal delivery group and caesarean section group [18]. There was only one patient underwent spinal anaesthesia in this study. However, based on the secondary outcome results that the obstetric anaesthesia did not influence the course of MS until 6 months postpartum [18]. This was true in this described patient too.

MS patients are more prone to develop hypotension, bradycardia, and cardiac arrhythmias because of a possible autonomic nervous system dysfunction. Therefore, a thorough preoperative cardiac assessment is essential. Further, it is important to be aware that vasopressor therapy will be less effective in treating episodes of hypotension in the MS population [19]. Thus, careful monitoring of haemodynamic status is important during caesarean section.

The safety profile of neuraxial anaesthesia in MS patients is well established nowadays. Therefore, a spinal anaesthesia and even more epidural technique are considered the better anaesthetic options in the obstetric MS patients [5]. In a survey among obstetric anaesthesiologist in United Kingdom, most prefer regional block for

labour and caesarean section in patients with MS. According to this survey, spinal anaesthesia is a valuable option for an emergency caesarean section in the obstetric MS population, to avoid the risk of general anaesthesia [20]. This case report of an obstetric MS patient and underwent a caesarean section under spinal anaesthesia. She had an excellent outcome in terms of intraoperative anaesthesia, smooth postoperative recovery including no relapse of the disease in the postpartum period in 6 months. She had multidisciplinary team care involving an anaesthetist, obstetrician, neonatologist, and neurologist. Further, her family members also involved in the decision – making process.

4. CONCLUSION

Although there was different opinion on anaesthesia and ceasarian section recent studies highlighted that both are equally effective. Still, we feel that the caesarean section under spinal anaesthesia in a woman with MS has safe like any healthy women.

REFERENCES

- Dalmas AF, Texier C, Ducloy-Bouthors AS, Krivosic-Horber R.Obstetrical analgesia and anaesthesia in multiple sclerosis. *Ann Fr Anesth Reanim.* 2003; 22:861-4. <https://doi.org/10.1016/j.annfar.2003.08.005> PMid:14644367
- Brück, W. Clinical implications of neuropathological findings in multiple sclerosis. *J Neurol* 2005;252(Suppl3): III10-III14. <https://doi.org/10.1007/s00415-005-2011-5>.PMid:16170494
- Vizcarra-Escobar D, Cava-Prado L, Tipismana-Barbaran M.Descripción clínico epidemiológica de una serie de pacientes. *Rev Neurol.* 2005;41:591-5 <https://doi.org/10.33588/rn.4110.2005213> PMid:16288421
- Chong HT, Li PCK, Ong B et al. Severe spinal cord involvement is a universal feature of Asians with multiple sclerosis: A joint Asian Study. *Neurol J Southeast Asia* 2002; 7: 35-40.
- R. Gamage, P. N. Weeratunga, H. P. M. C. Caldera et al., "Multiple sclerosis in a series of Sri Lankan patients clinical and radiological characteristics," *Neurology Asia*, vol. 18, no. 2, pp. 191-194, 2013.
- Paty DW. Initial Symptoms. In *Multiple Sclerosis: Diagnosis, Medical Management and Rehabilitation* by Burks JS and Johnson KP. Demos, New York, 2000.
- Traynor AJ, Aragon M, Ghosh D, Choi RS, Dingmann C, Vu Tran Z, Bucklin BA. Obstetric Anesthesia Workforce Survey: A 30-Year Update. *Anesth Analg.* 2016 Jun;122(6):1939-46. <https://doi.org/10.1213/ANE.0000000000001204> PMid:27088993
- Hopkins A, Alshaeri T, Akst S et al. Neurologic disease with pregnancy and considerations for the obstetric anesthesiologist. *Seminars in Perinatology* 2014; 38: 359-369 <https://doi.org/10.1053/j.semperi.2014.07.004> PMid:25176638
- Confavreux C, Hutchinson M, Hours MM, et al. Rate of pregnancy-related relapse in multiple sclerosis. *Pregnancy in Multiple Sclerosis Group. N Engl J Med* 1998; 339:285-91 <https://doi.org/10.1056/NEJM199807303390501> PMid:9682040

- Vukusic S, Hutchinson M, Hours M, Moreau T, Cortinovis-Tourniaire P, Adeleine P, Confavreux C; Pregnancy in Multiple Sclerosis Group. Pregnancy and multiple sclerosis (the PRIMS study): clinical predictors of post-partum relapse. *Brain*. 2004 Aug;127 (Pt 8):1912. PMID: 15130950. <https://doi.org/10.1093/brain/awh152>. PMid:15130950
- Vercauteren M, Heytens L. Anaesthetic considerations for patients with a preexisting neurological deficit: are neuraxial techniques safe? *Acta Anaesthesiol Scand*. 2007; 51:831-8. <https://doi.org/10.1111/j.13996576.2007.01325.x> PMid:17488315
- Upton A. M. and McComas A. 1973. The Double Crush in Nerve-Entrapment Syndromes. *Lancet* 302:359-362 [https://doi.org/10.1016/S0140-6736\(73\)93196-6](https://doi.org/10.1016/S0140-6736(73)93196-6)
- Kopp S. L., Jacob A. K. and Hebl J. R. 2015. Regional Anesthesia in Patients with Preexisting Neurologic Disease. *Reg. Anesth. Pain Med*. 40: 467-478. <https://doi.org/10.1097/AAP.0000000000000179> PMid:26115188
- Weber F., Rüdel R., Aulkemeyer P. and Brinkmeier H. 2002. The endogenous pentapeptide QYNAD induces acute conduction block in the isolated rat sciatic nerve. *Neurosci. Lett*. 317: 33-36. [https://doi.org/10.1016/S0304-940\(01\)02420-X](https://doi.org/10.1016/S0304-940(01)02420-X)
- Sakurai M., Mannen T., Kanazawa I. and Tanabe H. 1992. Lidocaine unmasks silent demyelinating lesions in multiple sclerosis. *Neurology*. 42: 2088. <https://doi.org/10.1212/WNL.42.11.2088> PMid:1331868
- Kuczkowski K. M. 2006. Labor analgesia for the parturient with neurological disease: what does an obstetrician need to know? *Arch. Gynecol. Obstet*. 274: 41-46 <https://doi.org/10.1007/s00404-006-0125-3> PMid:16463165
- Martucci G., Di Lorenzo A., Polito F. and Acampa L. A. 2011. 12-month follow-up for neurological complication after subarachnoid anesthesia in a parturient affected by multiple sclerosis. *Eur. Rev. Med. Pharmacol. Sci*. 15: 458460.
- Harazim H, Štourač P, Janků P, et al. Obstetric anesthesia/analgesia does not affect disease course in multiple sclerosis: 10-year retrospective cohort study. *Brain Behav*. 2018;8: e01082. <https://doi.org/10.1002/brb3.1082> PMid:30047260 PMCID: PMC6160638
- Lensch E. and Jost W. H. 2011. Autonomic disorders in multiple sclerosis. *Autoimmune Dis*. 2011 <https://doi.org/10.4061/2011/803841> PMid:21603189 PMCID: PMC3096149
- Drake E, Drake M, Bird J, Russell R. Obstetric regional blocks for women with multiple sclerosis: a survey of UK experiencing J *Obstet Anesth*. 2006; 15:115-23 <https://doi.org/10.1016/j.ijoa.2005.10.010> PMid:16488136