Journal of Gynecological Research and Obstetrics

Leslie Iffy*

Professor of Obstetrics & Gynecology (Retired), U.M.D.N.J. – New Jersey Medical School, Newark, New Jersey, USA

Dates: **Received:** 03 June, 2015; **Accepted:** 26 June, 2015; **Published:** 29 June, 2015

***Corresponding author:** Leslie Iffy, Professor of Obstetrics & Gynecology (Retired), U.M.D.N.J. – New Jersey Medical School, Newark, New Jersey, USA, Tel: 1-908-273-2651; E-mail: liffy@comcast.net

www.peertechz.com

Keywords: Shoulder dystocia; Erb's palsy; Birth injuries; 'two-step delivery'; Brachial plexus

Research Article

Prevention of Brachial Plexus Injuries at Birth

Introduction

Medicine is a fast evolving even if inexact science. Built in ancient times upon insightful observations of Egyptian, Greek and Arabic physicians [1], its progress was spearheaded by European (mainly British, French, German and Austrian) scientists after the middle ages. If the assignment of Nobel prizes is a guideline is this regard, in the last century the leadership was taken over by the United States. Both physicians and lay persons may be inclined to assume therefore, that the achievements of medical research are utilized in America in everyday practice and that progress runs parallel in all branches of medicine. As far as obstetrics is concerned these assumptions have limited validity at best. During the last century maternal and perinatal mortality rates (recognized indices of the quality of clinical care) were markedly less favorable in the USA than in Scandinavia [2] and some other developed countries. They still lag behind many others at the time of this writing.

It is not a matter of course that expanding medical knowledge translates to improved medical care. As an example, Mauriceau's milestone discovery in the 17th Century concerning the role of pelvic dimensions in the progress of labor [1] generated interest among physicians in "midwifery"; a field which had been outside the scope of their professional activities previously. However, this apparent progress was nothing short of a devastating catastrophe for mothers during the next 200 years. Doctors' diligent pelvic examinations in the course of labor triggered deadly 'childbed fever' epidemics that claimed the lives of tens, -if not hundreds of thousands- of women and newborn babies worldwide [3]. As a delayed effect of this unfortunate development, maternal infection rates following cesarean section were still as high as 90% in some American teaching hospitals at the end of the last century [4,5]; more than hundred years after the problem of effective prevention of puerperal infections had been resolved [3,6]. This was not the only adverse consequence of apparent "progress" in medical knowledge.

Injury to the brachial plexus at birth had usually been attributed to excessive traction, used by the accoucheur to overcome arrest of the shoulders following spontaneous or instrumental delivery of the head. The damaging effect of traction on the brachial plexus has been confirmed experimentally both on dead and live fetuses [7-9]. Nonetheless, the role of this mechanism became questioned when at the turn of the current century it transpired that about 40% of all obstetrical malpractice claims had derived from fetal injuries associated with this complication [10].

American obstetricians had reason to be concerned:

a) Malpractice claims imposed severe economic and emotional burdens upon practitioners.

b) Malpractice insurance fees exceeding $ 100.000/year forced some specialists out of practice.

c) It became difficult to attract well qualified young physicians into the field of obstetrics.

Against this background a group of physicians began to promote a new hypothesis, claiming that many –if not most- Erb's and Klumpke's palsies develop spontaneously 'in utero' as a result of physiological or dysfunctional uterine activity before or during labor [11,12]. For reasons of their own medical societies embraced this concept [13] and endorsed the promoters' contention that shoulder dystocia and the related fetal injuries are "unpredictable and unpreventable". Since this novel interpretation promised to remove doctors' legal responsibility for shoulder dystocia related birth injuries, understandably it soon received broad acceptance by American obstetricians. Their enthusiasm diverted attention from the fact that the attractive new explanation for congenital brachial plexus palsies was contradicted by a variety of clinical and epidemiological observations. It remained unconsidered furthermore, that acceptance of this reassuring idea could lead to further escalation of the number of birth injuries and ensuing litigations. When this unexpected threat materialized, it was obscured by the circulation of some inaccurate and, thus misleading statistics. Paradoxically, it was on the basis of grossly incorrect statistical data that the Royal College of Obstetricians and Gynaecologists in 2005 chose to adopt those 'shoulder dystocia guidelines' that doctors in the United States had followed during the preceding years [14,15].

Chronologic Fluctuations in the Rates of Shoulder Dystocia and Erb's Palsy

The hypothesis proposed by the earlier quoted group of obstetricians stipulates that many or most brachial plexus injuries occur 'in utero' as a result of spontaneous uterine activity. Had this assumption been correct, the incidence of arrest of the shoulders and that of Erb's palsy would be constant in any stable population. Pertinent studies show that this is not the case:

1. The incidence of arrest of the shoulders was only about 0.45% in the USA between 1950 and 1975. It increased to 1.1% by

1990 and then to 1.6% by 2005 [15]; an as yet unexplained exponential rise.

2. In one center serving a stable population the incidence of shoulder dystocia increased 5-fold between 1976 and 1981 [15,16]. Another obstetrical service experienced 8-fold increase between 1984 and 2005 [15,17].

3. Contrary to the American experience, in the British Islands the incidence of arrest of the shoulders remained at the range of 0.2% - 0.5% throughout the last five decades [14,15,18,19].

The "epidemic" rise of the rate of arrest of the shoulders was associated with a comparable increase in the number of Erb's palsies in the United States [20], making the cause – effect relationship between the two readily obvious. This trend necessitated the opening of neurological centers specializing in the repair of congenital brachial plexus injuries during the last decades throughout the United States [15].

Geographic Variations in the Rates of Shoulder Dystocia and Erb's Palsy

The incidence of shoulder dystocia varies on a broad scale in various parts of the world.

1. Arrest of the shoulders at birth occurred with closely identical frequency in the USA and the British Islands during most of the 20th century. It remained unchanged in Britain and Ireland until very recently. However, since the late 1970's, it increased in the USA almost four-fold [14,15,17-19].

2. A computer search for relevant data found that at the turn of the century in 15 medical centers of 11 countries located in four continents (listed later in this review) the incidence of shoulder dystocia had been about 0.5%. At the same time its rate was three-times as high in the USA [15]. Thus the factor or factors that multiplied the incidents of arrest of the shoulders in the USA had not been operative elsewhere.

3. In 2005 the RCOG made sweeping policy changes based on the understanding that the rates of shoulder dystocia and its sequelae- were similar in the UK and the USA [14]. Apparently, this misinterpretation remained uncorrected at that time. Only in 2014 did a circular published by the ACOG reveal that congenital Erb's palsy had been almost three-times as frequent in the United States as in the United Kingdom [20]. This finding is clearly inconsistent with the spontaneous 'in utero' injury hypothesis.

Effects of Practice Patterns upon Brachial Plexus Injuries

The incidence of arrest of the shoulders at birth was less than 0.5% in the USA in the 1950's [15]. The transformation of "obstetrics" into "perinatology" that began at about that time entailed profound changes in practice patterns. Most innovations were bound to reduce the risk of arrest of the shoulders at delivery and its dangerous consequences:

1. Indicated mid and high-cavity forceps deliveries and elective outlet procedures had been used routinely in America before the 1980's. These interventions were largely eliminated from practice thereafter. Because forceps extractions had been shown to be conducive to arrest of the shoulders [21], it was reasonable to anticipate that after their elimination the frequency of Erb's palsies would diminish. Actually, the very opposite happened [22].

2. Arrest of the shoulders is a complication of vaginal deliveries. Because the rate of cesarean sections increased from 5% to 30% during the last 60 years in most Western and South American countries, it was logical to "predict" that the frequency of arrest of the shoulders would be reduced [23]. At variance with this well-founded expectation the rate of shoulder dystocia increased three-fold during the subsequent years [24].

3. If many brachial plexus injuries occur spontaneously 'in utero', the incidence of Erb's palsy should not be substantially less following abdominal than after vaginal deliveries. Actually, they should be relatively frequent after cesarean sections performed for arrested labor. However, the relevant data indicate that a brachial plexus injury among neonates delivered by cesarean section is an unusual enough incident to deserve publication as literary rarity [25,26]. Proponents of the new hypothesis concerning the pathogenesis of Erb's palsy seem to consider it a matter of course that brachial plexus damage after abdominal delivery is 'ipso facto' evidence of spontaneous 'in utero' injury. However, theoretical deductions based on uterine physiology [27] and careful documentation of clinical observations [28] both indicate that use of excessive traction during abdominal deliveries can –and occasionally does- result in Erb's palsy.

4. Fetal macrosomia is one of the main predisposing factors for Erb's palsy [29]. In modern practice at least two independent factors limit the number of vaginal deliveries of large for gestational age fetuses:

   a) Routine screening for maternal diabetes and intensive treatment of the identified cases. This policy tends to reduce the number of macrosomic fetuses at term gestation.

   b) Liberal indications for abdominal delivery of large for gestational age babies, including those arrested in the birth canal due to feto-pelvic disproportion.

   These innovations should have resulted in considerable reduction of the number of congenital Erb's palsies in the USA [30] but obviously they did not.

5. If 'in utero' brachial plexus injury had been a relatively frequent phenomenon, many Erb's palsies would have been unrelated to arrest of the shoulders. However, in the author's "data base" of more than 300 birth injuries in various American medical centers, the documentations revealed that 93% of them carried the clinical diagnosis of arrest of the shoulders [29].

With the exception of epidural anesthesia, new developments in obstetrics have been conducive to reduced incidence of fetal injuries [26]. This being the case the earlier outlined American trends require some plausible explanation.

The Role of Method of Delivery in the Causation of Brachial Plexus Palsy

During most of the 20th Century management of the birthing process was conservative both in the British Islands and in the USA. Standard American textbooks instructed physicians to refrain from interfering with spontaneous birth [31-33]. Their favored approach cited as "two-step delivery" in recent publications [34,35], left the expulsion of the body following the emergence of the head to the next contraction. This technique was still popular in the UK at the end of the last century [36,37]. Without preceding clinical trial, Prichard and McDonald, authors of the influential Williams Obstetrics, decided to recommend elective extraction of the body of the fetus immediately after the delivery of the head in the 1976 edition of their book [38]. They offered no explanation for their advice. Yet, with the exception of those edited by the writer of this review [39,40], American textbooks printed after 1976 uncritically followed the technique promoted by Williams Obstetrics. The adverse consequences of this capricious innovation received little consideration either before or after their eventual occurrence:

1. Prior to the publication of the 15th edition of Williams Obstetrics the incidence of shoulder dystocia had been 0.45% in the USA. Fifteen years later it became as high as 1.1%. It further increased to 1.6% during the subsequent decade [15].
2. Motivated by the belief that babies benefit from quick escape from the birth canal, well-meaning research workers conducted experiments designed to cut head-to-body delivery time to a minimum. In this process, more than 10% of their experimental subjects experienced arrest of the shoulders at delivery [41,42]. This unprecedented "shoulder dystocia tsunami", did not appear disconcerting for the reviewers who approved their successive reports for publication in a leading medical journal.
3. As some American investigators increased their rates of shoulder dystocia 50-fold while they ambitiously reduced head-to-body delivery times, others in the USA [43] and Italy [35], whose research centered on the "two-step delivery" technique, experienced incidents at the range of 0.2%.
4. The "two-step delivery" method was officially reintroduced into practice in Hungary in 1999 [44].

One year before this change of policy 1.2% rate of arrest of the shoulders had been reported by one research worker [45]. Ten years after the return to conservative management of childbirth in their country another group of investigators reported an incidence of 0.24% [46].

Considerations Pertaining to the Physiology of the Birthing Process

Promoters of the 'in utero' Erb's palsy concept and prompt manual extraction of the fetus from the birth canal tend to disregard basic principles of the physiology of labor and delivery:

1. It has been long understood that amniotic fluid protects the fetal body from injury on account of "Pascal's law of fluids". The latter stipulates that pressure is equally distributed inside fluid filled spaces. Yet, the logical deduction, namely that avoidance of artificial rupture of the membranes might prevent some 'in utero' fetal injuries has not been mentioned in their publications.
2. Use of traction in the absence of uterine contraction is conducive to injury and is stressful for the fetus. This is why extraction with ventouse is considered contraindicated in the absence of contraction even in case of fetal compromise. Yet, relevant disputes have been generally restricted to the question of whether traction should follow the expulsion of the head immediately or 30-60 seconds later. Since in either case the uterus is in diastole at the time of the proposed traction, the intervention predictably invites arrest of the shoulders during delivery. This expectation was confirmed by the following study:
3. The author's group analyzed the records of 104 shoulder dystocia related birth injuries where the head-to-body delivery times had been documented. They found that 80% of the babies had been extracted within 3 minutes. Thus the damages must have occurred while traction was applied after the expulsion of the head [26]. Writers of 20th Century American textbooks advised patient waiting for the next uterine contraction during this time period [31-33]. At the end of the last century British authors provided similar instructions [36,37]. Beyond any reasonable doubt, in the services of these authorities most of the mentioned injuries would have been avoided.

Conclusions

The available evidence indicates that the rapid increase of the incidence of shoulder dystocia [15,29] and that of Erb's palsy [20] is a phenomenon specific to the United States. The self-serving dictum: "shoulder dystocia is unpredictable and unpreventable", discourages attempts to resolve this problem. Such a policy is counterproductive but luckily, there is no more need for experimentation to prevent shoulder dystocia than for research to discover the wheel. Obstetricians already knew a century ago how to avoid most incidents of brachial plexus damage. Doctors in England [18,19,45], Italy [48], Norway [49], Ireland [50], Hungary [46], Sweden [50], Israel [52,53], China [54], Canada [55] Australia [56], France [57] and probably in several other countries are still capable of delivering babies with little risk of birth injury. It is likely that their methods of delivery differ little from those offered by the earlier quoted old masters of obstetrics [27,31-33,37,39].

The victims of Erb's palsy are thousands of disabled American children and the small army of capable obstetricians who are unable to pursue their practice on account of unaffordable malpractice premiums. According to well informed experts in some hospitals specialists seek protection against adverse malpractice verdicts by

categorically excluding from their medical records the term "shoulder dystocia" [58]. In case of court action, this 'innocent' omission supports the standard line of defense, namely that the injury occurred in 'utero' and was therefore unrelated to the delivery process. In the light of this information it is a matter of interest that while old publications had seldom if ever disputed the existence of a close relationship between arrest of the shoulders and Erb's palsy, recent reviews coming from some institutions found many if not most incidents of brachial plexus damage unrelated to arrest of the shoulders.

"Quae volumus credimus libenter." (We like to believe what we wish to be true.)

This ancient Roman proverb has not lost its validity after two millennia. For some time obstetricians in America may elect therefore to continue taking solace in the myth that shoulder dystocia and brachial plexus palsy are "unpredictable and unpreventable" [11-13,59]. However, their colleagues in other corners of the world do not need to face the dire consequences of this wishful assumption.

References

1. Lyons AS, Petrucelli RJ II (1978) Medicine. An Illustrated History. Harry N. Abrams, Inc., New York.
2. Iffy L, Apuzzio JJ, Mitra S, Evans H, Ganesh V, et al. (1994) Rates of cesarean section and perinatal outcome. Acta Obstet Gynecol Scand 73: 225 - 230.
3. Semmelweis IP (1861) Die Aetiologie, der Begriff and die Prophylaxis des Kindbettfiebers. Pest, Wien und Leipzig. (In German.)
4. Iffy L, Kaminetzky HA , Maidman JE, Lindsey JE, Arrata WSM (1979) Control of perinatal infection by traditional preventive measures. Obstet Gynecol 54: 403 - 411.
5. Iffy L (2015) Ajanlas. In: Papp Z. (ed) A Varandosgondozas Kezikonyve. Medicine Publ. Budapest. (In Hungarian.)
6. Holmes OW. (1843) The contagiousness of puerperal fever. Presentation at the meeting of the Boston Society of Medical Management.
7. Sever JW (1916) Obstetric paralysis, its etiology, pathology, clinical aspects and treatment with the report of four-hundred and seventy cases. Am J Dis Children 12: 541 - 578.
8. Metaizeau JP, Gayet C, Plenat F (1979) Les lesions obstetricales du plexus brachial. Chir Pediatr 20: 159 - 163. (In French.)
9. Allen RH (2003) Complete brachial plexus impairment: a traction related injury. Am J Obstet Gynecol 188: 858-859.
10. (2000) Medical Malpractice Verdicts, settlements & experts 18:10.
11. Gherman RB, Chaucham S, Ouzonian JG, Lerner H, Gonik B, et al. (2006) Shoulder dystocia: the unpreventable obstetric emergency with empiric management guidelines. Am J, Obstet Gynecol 195: 657 - 672.
12. Sandmire HF, DeMott RK (2000) Erb's palsy: concepts of causation. Obstet Gynecol 95: 941 -942.
13. American Academy of Pediatrics and American College of Obstetricians and Gynecologists (2002) Guidelines for perinatal care. Washington, D.C., U.S.A.
14. Royal College of Obstetricians and Gynaecologists (2005) Shoulder dystocia. Guideline 42, London, U.K.
15. Iffy L, Varadi V, Papp Z (2015) Epidemiologic aspects of shoulder dystocia related neurological birth injuries. Arch Gynecol Obstet 291: 769 - 777.
16. Hopwood HG Jr (1982) Shoulder dystocia: fifteen years' experience in a community hospital. Am J Obstet Gynecol 144: 162-166.
17. Dondalu, Lawrence L, Gaughan JP, Harmonli OH, Jaspan D, et al. (2005) Trends in the rate of shoulder dystocia over two decades. J Mat Fet Neonat Med 18: 305 - 310.
18. Evans-Jones G, Kay SP, Weindling AM, Cranny G, Ward A, et al. (2003) Congenital brachial plexus palsy. Arch Dis Child Fetal Neonat Med 88: F185 - F189.
19. McKenzie IZ, Shah M, Lean K, Dutton S, Newdick H, et al. (2007) Management of shoulder dystocia. Trends and incidence of neonatal mortality. Obstet Gynecol 110: 1059 -1068.
20. American College of Obstetricians and Gynecologists (2014) Neonatal brachial plexus palsy. Chapter 1, p. 3, Washington, D.C., U.S.A. d595 617.4'83044-dc23.
21. Benedetti TJ, Gabbe SG (1978) Shoulder dystocia: a complication of fetal macrosomia and prolonged second stage of labor with mid-pelvic delivery. Obstet Gynecol 52: 526 - 529.
22. Brimacombe M, Iffy L, Apuzzio JJ, Varadi V, Nagy B, et al. (2008) Shoulder dystocia related fetal neurological injuries: the predisposing roles of forceps and ventouse extractions. Arch Gynec Obstet 277: 415 - 422.
23. Benedetti TJ (1987) Shoulder dystocia. In: Pauerstein CJ (ed) Clinical Obstetrics, Wiley, New York 871 - 882.
24. Varadi V, Papp Z, Iffy L (2014) Elimination of predisposing factors for brachial plexus birth injuries. Arch Perinat Med 20: 155 – 161.
25. Ubach JM, Slooff AC, Peeters LL (1995) Obstetric antecedents of surgically treated obstetric brachial plexus injuries. Br J Obstet Gynaecol 102: 813 - 817.
26. Iffy L (2014) Prevention of shoulder dystocia related birth injuries: myths and facts. World J Obstet Gynecol 3: 148 - 161.
27. Stirrat GM, Taylor RW (2002) Mechanism of obstetrical plexus palsy: a critical analysis. Clinical Risk 8: 218 - 222.
28. Iffy L, Pantages P (2005) Erb's palsy after delivery by cesarean section. Med Law 24: 655 - 661.
29. Iffy L, Brimacombe M, Apuzzio JJ, Varadi V, Portuondo N, et al. (2008) The risk of shoulder dystocia related fetal injury in relation to birth weight. Eur J Obstet Gynecol Repr Biol 136: 53 - 60.
30. Iffy L, Brimacombe M, Varadi V, Raghuwanshi MP, Ganesh V, et al. (2009) Shoulder dystocia related fetal neurological injuries: the role of diabetic control. Central Eur J Med 4: 76 - 83.
31. Eastman NJ, Hellman LM (1961) Williams Obstetrics, 12th ed., Appleton-Century-Crofts, New York 384.
32. Greenhill JP (1955) Obstetrics, 11th ed., WB Saunders, Philadelphia, 278.
33. Bryant RD, Danforth DN (1971) Conduct of normal labor. In: Danforth DN (ed) Textbook of Obstetrics and Gynecology, 2nd ed., Harper & Row, New York 561 - 584.
34. Ramieri J, Iffy L (2006) Shoulder dystocia. In: Apuzzio JJ, Vintzileos AM, Iffy L (eds) Operative Obstetrics, 3rd ed., Taylor & Francis, London & New York, pp. 253 - 263.
35. Locatelli A, Incerti M, Ghidini A, Longini A, Casarico G, et al. (2011) Head-to-body delivery interval using 'two-step' approach in vaginal deliveries: effect on umbilical artery pH. J Mat Fet Neonat Med 24: 799 - 803.
36. Myles M (1985) Textbook for Midwives, 10th ed., Churchill-Livingstone, Edinburgh.
37. Roseveas SK, Stirrat GM (1996) Handbook of Obstetric Management, Blackwell Science, Oxford 251.
38. Pritchard JA, MacDonald PC (1976) Williams Obstetrics, 15th ed., Appleton-Century-Crofts 337 - 338.
39. Bottoms SF, Sokol, RJ (1981) Mechanism and conduct of labor. In: Iffy L, Kaminetzky HA (eds) Principles and Practice of Obstetrics & Perinatology, Wiley, New York 815 - 838.

40. Stenchever MA, Sorensen TK (1992) Normal vaginal delivery and manual extraction procedures. In: Iffy L, Apuzzio JJ, Vintzileos ME (eds) Operative Obstetrics, 2nd ed., McGrew-Hill, New York 224 - 233.

41. Spong CY, Beall M, Rodrigues D, Ross MG (1995) An objective definition of shoulder dystocia: prolonged head-to-body delivery intervals and/or the use of ancillary obstetric maneuvers. Obstet Gynecol 86: 433 - 436.

42. Beall MH, Spong CY, Ross MG (2003) A randomized control trial of prophylactic maneuvers to reduce head-to-body delivery time in patients at risk for shoulder dystocia. Obstet Gynecol 102: 31 - 35.

43. Iffy L (1987) Discussion of the presentation of Dr. TL Gross. Am J Obstet Gynecol 168:1416.

44. Papp Z (1999) A Szuleszet - Nogyogyaszat Tankonyve, Semmelweis Publ., Budapest. p. 432. (In Hungarian.)

45. Katona F (1998) Klinikai Fejlodesneurologia, Medicine Publ., Budapest. (In Hungarian.)

46. Fejes M, Koncz J, Szekelyi Z, Varadi K (2011) A szuleszeti brachialis plexus palsy epidemiologiaja. Gyermekgyogyaszat, 62 : 65 - 70. (In Hungarian.)

47. Smith RB, Lane C, Pearson JF (1994) Shoulder dystocia: what happens at next delivery? BJOG 101: 713 - 717.

48. Strobelt N, Locatelli A, Casarico G (2006) Head-to-delivery interval time: what is the normal range? Obstet Gynecol 195: S110 - 114.

49. Overland EA, Vanen IJ, Eskild A (2014) Pregnancy week at delivery and the risk of shoulder dystocia: a population-based study of 2,014,956 deliveries. BJOG 121: 34 - 41.

50. Al Hadi N, Geary M, Byrne P, McKenna P (2005) Shoulder dystocia. J Obstet Gynecol 21:

51. Christofferson M (2002) Shoulder dystocia and brachial plexus injury. Gynecol Obstet Invest 53: 42 - 47.

52. Kees S, Margaly V, Schiff E, Masiach S, Carp KJ (2001) Features of shoulder dystocia in a busy obstetric unit. J Reprod Med 46: 583 - 588.

53. Lurie S, Levy R, Ben-Arie A, Hagay Z (1995) Shoulder dystocia. Am J Perinat 12: 61 – 62.

54. Chang YK, Lao TT, Sahota DS, Leung VK, Leung TY (2013) Use of birth weight threshold for macrosomia to identify fetuses at risk of shoulder dystocia among Chinese populations. Int J Obstet Gynecol 120: 249 - 253.

55. Baskett TF, Allen AC (1995) Perinatal implications of shoulder dystocia. Obstet Gynecol 86: 14 - 17.

56. Johnston NR (1979) Shoulder girdle dystocia. Aust N Z J Obstet Gynecol 19: 28 - 31.

57. Mazouni R, Porcu Cohen-Solal A, Heckenroth H, Guidicelli B, Bonnier P, et al. (2006) Maternal and anthropomorphic risk factors of shoulder dystocia. Acta Obstet Gynecol Scand 85:567-570.

58. Schifrin BS, Cohen WR (2009) The maternal fetal medicine viewpoint: causation and litigation. In: O'Leary JA (ed) Shoulder Dystocia and Birth Injury. Humana Press, Towaco, New Jersey 227 - 247.

59. Beer E, Mangiante G, Pecorari D. (2006) Distocia Delle Spalle. CIC Edizioni Internationali, Roma, p. 135. (In Italian.).

Citation: *Iffy L (2015) Prevention of Brachial Plexus Injuries at Birth. J Gynecol Res Obstet 1(1): 001-005.*