Rev Bras Anestesiol
2009; 59: 2: 142-153

ARTIGO CIENTÍFICO
SCIENTIFIC ARTICLE

Anestesia Regional e Trombocitopenia Não Pré-Eclâmptica; Hora de Repensar o Nível Seguro de Plaquetas*

Regional Anesthesia and Non-Preeclamptic Thrombocytopenia: Time to Re-Think the Safe Platelet Count

Motoshi Tanaka[1], Mrinalini Balki[2], Anne McLeod[3], Jose C. A. Carvalho, PhD, FANZCA, FRCPC[4]

SUMMARY
Tanaka M, Balki M, McLeod A, Carvalho JCA — Anestesia Regional e Trombocitopenia Não Pré-Eclâmptica: Hora de Repensar o Nível Seguro de Plaquetas.

JUSTIFICATIVA E OBJETIVOS: *Apesar de a anestesia regional ser amplamente utilizada no controle da dor em obstetrícia, seu uso pode não ser apropriado nas pacientes com trombocitopenia por causa do risco de hematoma no neuroeixo. Não existem fortes evidências sugerindo número mínimo de plaquetas necessário para garantir a segurança na realização da anestesia regional. O objetivo deste estudo foi rever a segurança da anestesia regional em pacientes com trombocitopenia não pré-eclâmptica na instituição durante período de cinco anos.*

MÉTODO: *Foi realizada revisão retrospectiva dos prontuários médicos de todas as pacientes obstétricas não pré-eclâmpticas cujo parto foi realizado na instituição entre abril de 2001 e março de 2006 e que apresentaram contagem de plaquetas < 100 x $10^9.L^{-1}$ no dia da anestesia. A etiologia da trombocitopenia, o tipo de anestesia, tipo de parto e as principais complicações anestésicas foram registrados.*

RESULTADOS: *Foram identificadas 75 pacientes, das quais 47 (62,2%) receberam anestesia regional. A etiologia da trombocitopenia incluiu púrpura trombocitopênica imune, em 49 pacientes; trombocitopenia gestacional, em 20 pacientes; e outras causas em seis pacientes. Anestesia regional foi utilizada em 91,9% das pacientes com nível de plaquetas entre 80 a 99 x $10^9.L^{-1}$ e em 48,1% das pacientes com nível de plaquetas entre 50 e 79 x $10^9.L^{-1}$. Em nenhuma das 11 pacientes que apresentavam plaquetas abaixo de 50 x $10^9.L^{-1}$ foi administrada anestesia regional. Não houve complicações neurológicas.*

CONCLUSÕES: *Nos casos estudados, a anestesia regional foi administrada com segurança nas gestantes com nível de plaquetas entre 50 - 79 x $10^9.L^{-1}$. Neste estudo os resultados são semelhantes aos de outras séries relatadas na literatura. Sugere-se que nas pacientes sem eclâmpsia com um nível estável de plaquetas e sem história prévia ou sinais clínicos de sangramento, o limite inferior de 50 x $10^9.L^{-1}$ deve ser adotado.*

Unitermos: DOENÇAS, Hematológica: trombocitopenia; EXAMES COMPLEMENTARES: contagem de plaquetas; TÉCNICAS ANESTÉSICAS: Regional.

SUMMARY
Tanaka M, Balki M, McLeod A, Carvalho JCA — Regional Anesthesia and Non-Preeclamptic Thrombocytopenia: Time to Re-Think the Safe Platelet Count

BACKGROUND AND OBJECTIVES*: Although regional anesthesia is widely used for pain control in obstetrics, it may not be appropriate for patients with thrombocytopenia due to the risk of neuraxial hematoma. There is no strong evidence to suggest the minimum platelet count that is necessary to ensure the safe practice of regional anesthesia. The purpose of this study was to review the safety of regional anesthesia in non-preeclamptic thrombocytopenic parturients at our institution over a 5-year period.*

METHODS*: A retrospective chart review was performed in all the non-preeclamptic obstetric patients who delivered at our facility between April 2001 and March 2006, and had platelet counts < 100 × $10^9.L^{-1}$ on the day of anesthesia. The etiology of the thrombocytopenia, type of anesthesia, mode of delivery and major anesthetic complications were noted.*

RESULTS*: Seventy-five patients were identified, 47 of whom (62.6%) had received regional anesthesia. The etiology of their thrombocytopenia was immune thrombocytopenic purpura in 49 patients, gestational thrombocytopenia in 20 and other causes in 6 patients. Regional anesthesia was administered in 91.9% of the patients with platelet counts of 80 to 99 × $10^9.L^{-1}$ and in 48.1% of the patients with platelet counts of 50 to 79 × $10^9.L^{-1}$. None of the 11 patients with platelet counts below 50 × $10^9.L^{-1}$ received regional anesthesia. There were no neurological complications.*

CONCLUSIONS*: In our series, regional anesthesia was safely administered in pregnant patients with platelet counts between 50-79 × $10^9.L^{-1}$. Our results are in keeping with other series in the literature. We suggest that in non-preeclamptic patients with stable platelet counts and no history or clinical signs of bleeding, the lower limit of platelet count for regional anesthesia should be 50 × $10^9.L^{-1}$*

Keywords: ANESTHETIC TECHNIQUES: Regional; COMPLEMENTARY EXAMS: platelet count; DISEASES, Hematologic: thrombocytopenia.

Recebido (Received from**) Departments of Anesthesia, Obstetrics and Gynecology and Medicine, Mount Sinai Hospital, University of Toronto, Ontario, Canada*

1. Obstetric Anesthesia Fellow, Mount Sinai Hospital, University of Toronto
2. Assistant Professor, Department of Anesthesia, University of Toronto
3. Assistant Professor, Department of Medicine, University of Toronto
4. Associate Professor, Department of Anesthesia and Department of Obstetrics and Gynecology, University of Toronto

*Apresentado (**Submitted**) em 28 de dezembro de 2008*
*Aceito (**Accepted**) para publicação em 05 de janeiro de 2009*

Endereço para correspondência (Correspondence):
Dr. Jose C. A. Carvalho, MD
Department of Anesthesia and Pain Management, Mount Sinai Hospital
600 University Avenue, Room 781
Toronto, Ontario, M5G 1X5, Canada
E-mail: jose.carvalho@uhn.on.ca

e, consequentemente, não é possível chegar a uma conclusão quanto à função plaquetária nas gestantes com trombocitopenia.

Recentemente, Wee e col. conduziram pesquisa sobre a prática da anestesia no neuroeixo e problemas da coagulação em 264 unidades obstétricas no Reino Unido [43]. Eles descobriram que nas gestantes com PTI e plaquetas entre $80 \times 10^9.L^{-1}$ e $100 \times 10^9.L^{-1}$, 64 a 74% das unidades praticavam anestesia regional; naquelas com $50 \times 10^9.L^{-1}$ e $79 \times 10^9.L^{-1}$ plaquetas, 22 a 31% das unidades utilizavam anestesia regional e naquelas com $50 \times 10^9.L^{-1}$ plaquetas, 4 a 9% usavam anestesia peridural. Esse resultado é muito semelhante ao desse estudo, no qual a maioria das gestantes com mais de $80 \times 10^9.L^{-1}$ plaquetas receberam anestesia regional, enquanto apenas 48,1% das gestantes com $50 \times 10^9.L^{-1}$ a $79 \times 10^9.L^{-1}$ plaquetas usaram anestesia regional.

Baseado na combinação desses seis estudos retrospectivos, dois relatos de casos e nossos próprios resultados, documentou-se um total de 328 pacientes com $50 \times 10^9.L^{-1}$ a $100 \times 10^9.L^{-1}$ plaquetas que receberam anestesia regional sem complicações hemorrágicas. Apesar de a estratificação das pacientes ter sido diferente entre esses estudos, fica claro que pelo menos 40 pacientes apresentavam entre 50 e $80 \times 10^9.L^{-1}$ plaquetas (Tabela III). Acreditamos que as evidências presentes na literatura suportam a redução do limite inferior de segurança do nível de plaquetas para a realização de anestesia regional em pacientes que não exibam sinais de sangramento anormal na presença de trombocitopenia não pré-eclâmptica.

Além disso, as diretrizes atuais publicadas pela *British Society for Hematology* em 2003 afirmam que não é necessário tratar as pacientes assintomáticas com PTI e plaquetas $> 20 \times 10^9.L^{-1}$ até que o parto seja eminente e que níveis de plaquetas $> 50 \times 10^9.L^{-1}$ são consideradas seguras tanto para o parto vaginal quanto para a cesariana [44]. Da mesma forma, propomos que $50 \times 10^9.L^{-1}$ plaquetas deve ser considerado o nível mínimo seguro para a administração de anestesia regional em gestantes sem pré-eclampsia desde que esse grupo de pacientes esteja estável e não apresente alterações na função plaquetária.

O estudo apresentado foi limitado pela sua natureza retrospectiva e, por isso, a condução anestésica foi ditada pelo anestesiologista responsável e os testes de função plaquetária dessas pacientes não estavam disponíveis antes do parto. Relatos futuros de outras séries de pacientes que receberam anestesia regional no contexto de trombocitopenia da gravidez ajudarão a construir um banco de dados maior para solidificar nossa recomendação. Além disso, estudos adicionais explorando o uso dos exames de função plaquetária que possam ser feitos no leito e que identifiquem as pacientes com coagulação normal na presença de trombocitopenia ajudarão os anestesiologistas a decidir sobre o uso seguro da anestesia regional nesse grupo de pacientes.

Regional Anesthesia and Non-Preeclamptic Thrombocytopenia: Time to Re-Think the Safe Platelet Count

Motoshi Tanaka, M.D.; Mrinalini Balki, M.D.; Anne McLeod, M.D., FRCPC; Jose C. A. Carvalho, M.D.; PhD, FANZCA, FRCPC

INTRODUCTION

Thrombocytopenia is a relatively common condition in pregnancy, occurring in up to 10% of patients [1]. In non-pregnant patients, the normal platelet count varies between 150 and $400 \times 10^9.L^{-1}$. However, several studies have shown that the mean platelet count decreases by approximately 10% in pregnancy, and approximately 1% of pregnant women are found to have a platelet count $< 100 \times 10^9.L^{-1}$ [1-3]. Although a variety of obstetric conditions cause thrombocytopenia, most cases are related to gestational thrombocytopenia, immune thrombocytopenic purpura (ITP) or preeclampsia [2]. The bleeding risk due to thrombocytopenia varies according to its etiology. Based on the expert opinion by Warkentin et al, unlike preeclamptic patients, destructive thrombocytopenic disorders such as ITP are associated with large, "hyperfunctional" platelets, and consequently there is a possibility of a lower bleeding risk at a given platelet count [4].

Regional anesthesia is currently a standard of practice for labour pain relief in most obstetric units, and all efforts towards its safe use should be encouraged [5]. However, the safety of regional anesthesia in the presence of thrombocytopenia has been controversial, due to the risk of neuraxial hematoma and neurological sequelae [6]. It is therefore of utmost importance that we continue to investigate the safety of regional anesthesia in this subset of patients.

Cousins and Bromage recommended that epidural punctures should be avoided if the platelet count is below $100 \times 10^9.L^{-1}$, based on the studies on bleeding time (BT) [6]. This recommendation, however, has been disputed. It has been suggested that it is appropriate to lower the platelet count threshold for insertion of an epidural catheter to 75 to $80 \times 10^9.L^{-1}$ in the absence of abnormal coagulation, and that for those with platelet counts of 50 to $75 \times 10^9.L^{-1}$, the benefits of regional anesthesia versus the risk of neuraxial hematoma should be weighed [7, 8].

In 2002, the guidelines published by the American College of Obstetricians and Gynecologists suggested that patients with platelet counts between $50 \times 10^9.L^{-1}$ and $100 \times 10^9.L^{-1}$ might be potential candidates for regional analgesia [9]. Although some anesthesiologists will embrace these recommendations and eventually consider regional anesthesia in patients with platelet counts above $50 \times 10^9.L^{-1}$, the vast majority will continue to use the cut-off limit of 75 to $80 \times 10^9.L^{-1}$.

The origins of this safe lower limit of platelet counts (75 to 80 $\times$ $10^9.L^{-1}$) for regional anesthesia are not clear. Very few studies have tried to correlate platelet counts with assays of primary hemostasis. Orlikowski et al. measured platelet counts, thromboelastography (TEG) parameters and BT in healthy pregnant women and in women with preeclampsia/eclampsia [10]. They found that the platelet function remained normal until the platelet count decreased to 54 $\times$ $10^9.L^{-1}$ (95% confidence limits 40 to 75 $\times$ $10^9.L^{-1}$). It is quite possible that the current cut-off limit of 75 to 80 $\times$ $10^9.L^{-1}$ came from this particular study, which basically looked at preeclamptic patients. On the other hand, several small patient series have been published supporting the safety of regional anesthesia in patients with platelet counts above 50 $\times$ $10^9.L^{-1}$ [11-14].

The purpose of this study was to review the use of regional anesthesia in non-preeclamptic thrombocytopenic parturients at our institution, in order to further contribute to data supporting the adoption of a platelet count lower than the current widely accepted 75 to 80 $\times$ $10^9.L^{-1}$ as a safe lower limit for regional anesthesia in this specific subset of obstetric patients.

METHODS

After obtaining approval from the Research Ethics Board, a retrospective chart review was conducted at Mount Sinai Hospital in Toronto. We reviewed the electronic health record data at our facility to identify all women with thrombocytopenia who delivered during the period April 1, 2001 to March 31, 2006. We particularly selected patients with platelet counts below 100 $\times$ $10^9.L^{-1}$ on the day of anesthesia and their charts were obtained for detailed reviews. Patients who were diagnosed with preeclampsia or hypertension were excluded. Preeclampsia was defined as sustained systolic blood pressure of at least 140 mmHg or a sustained diastolic blood pressure of at least 90 mmHg after 20 weeks of gestation, and proteinuria in accordance with American College of Obstetricians and Gynecologists guidelines [15]. While hypertension was defined as high blood pressure present before 20 week of gestation or present before pregnancy [16].

For each patient, the etiology of the thrombocytopenia (e.g. ITP, gestational thrombocytopenia, etc.), the platelet count on the day of anesthesia, the anesthetic technique (epidural, spinal, general or no anesthesia), the mode of delivery (vaginal or cesarean delivery) and any neurological deficits during hospitalization were identified.

RESULTS

During the study period, 33,692 parturients delivered at our institution, of which 104 (0.3%) had a diagnosis of thrombocytopenia without accompanying preeclampsia or hypertension. Of these 104 patients, 75 had platelet counts $\times$ $10^9.L^{-1}$ on the day of anesthesia, and 47 of these 75 patients (62.7%) were administered regional anesthesia for delivery. The etiology of their thrombocytopenia was ITP in 49 patients, gestational thrombocytopenia in 20 patients and other causes in 6 patients (Table I).

Table I – Etiology of Thrombocytopenia

	(N = 75)
Immune thrombocytopenic purpura (ITP)	49
Gestational thrombocytopenia	20
Others	
Liver cirrhosis	2
Paroxysmal nocturnal hemoglobinuria	1
Antiphospholipid syndrome	1
No diagnosis	2
Total	75

The modes of delivery and anesthesia techniques are listed in Table II, according to the categories of platelet count levels on the day of anesthesia. In patients with platelet counts between 80 $\times$ $10^9.L^{-1}$ and 99 $\times$ $10^9.L^{-1}$ on the day of anesthesia, 34 of the 37 patients (91.9%) received regional anesthesia (17/20 for vaginal delivery, 17/17 for cesarean delivery). In this subgroup, three patients were not administered regional anesthesia for vaginal delivery, but the reasons for not using regional anesthesia were unrelated to their platelet counts. In the subgroup of patients with platelet counts between 50 $\times$ $10^9.L^{-1}$ and 79 $\times$ $10^9.L^{-1}$, 13 of the 27 patients (48.1%) received regional anesthesia, while in those with platelet counts less than 50 $\times$ $10^9.L^{-1}$ (11 patients), none received regional anesthesia. Out of 28 patients who were not administered regional, 11 had a platelet count of $< 50 \times 10^9.L^{-1}$; three of which also had bleeding symptoms. The remaining 17/28 patients had a platelet count of $> 50 \times 10^9.L^{-1}$, and although none of them presented with any bleeding symptoms, regional was denied either by the attending anesthesiologist (n =13) or by the patient herself (n = 4). Among those receiving epidural anesthesia, the lowest platelet count was 63 $\times$ $10^9.L^{-1}$, and among those receiving spinal anesthesia, it was 58 $\times$ $10^9.L^{-1}$. The incidence of cesarean delivery was 40% (30/75). No serious anesthesia-related complications, such as neurological deficits or paralysis, were identified in this series. Data are presented descriptively only.

DISCUSSION

Thrombocytopenia constitutes a relative contra-indication to regional anesthesia in obstetrics. The major concern is the risk of neuraxial hematoma secondary to bleeding in patients with decreased platelet levels.

In the general population, the incidence of neuraxial hematoma after epidural and spinal anesthesia has been estimated at 1:150,000, and 1:220,000 respectively [17]. In obstetric patients, a recent study of over one million parturients found the

Table II – Mode of Delivery and Anesthesia Technique According to Platelet Count on the Day of Anesthesia

Platelet count ($\times 10^9.L^{-1}$)	Vaginal delivery Epidural/CSE Analgesia N (%)	Cesarean Delivery		All Patients Regional Analgesia/ Anesthesia N (%)
		Regional Anesthesia N (%)	Spinal Anesthesia N (%)	
< 50	0 / 6 (0.0)	0 / 5 (0.0)	0	0 / 11 (0.0)
50 - 59	0 / 0 (0.0)	2 / 3 (66.7)	2	2 / 3 (66.7)
60 - 69	2 / 9 (22.2)	0 / 1 (0.0)	0	2 / 10 (20.0)
70 - 79	7 / 10 (70.0)	2 / 4 (50.0)	2	9 / 14 (64.3)
80 - 89	7 / 9 (77.8)	9 / 9 (100)	7	16 / 18 (88.9)
90 - 99	10 / 11 (90.9)	8 / 8 (100)	6	18 / 19 (94.7)
Total	26 / 45 (57.8)	21 / 30 (70.0)	17	47 / 75 (62.7)

CSE - combined spinal epidural.

incidence of neuraxial hematoma after epidural anesthesia to be 1:168,000[18]; however, the incidence of neuraxial hematoma after spinal anesthesia is unknown [19].

To our knowledge, only 12 cases of neuraxial hematoma in pregnant patients have been reported in the English language literature, 10 of which have been reviewed by Beilin et al. [20]. The first three cases were only diagnosed clinically [19-21], and two of them were found to have narrow lumbar spinal canals on X-ray [21,22], while the etiology in the third case was not mentioned [23]. Three other cases were found to be patients with anatomical abnormalities of their spines which were not diagnosed before the initiation of regional anesthesia, two with spinal ependymoma [24,25], and one with neurofibromatosis [26]. Two cases had severe preeclampsia with coagulation disorder [27,28]. One patient had cholestasis of pregnancy with abnormal coagulation [29]. The details in one case were not available [30]. The remaining two cases, reported by Moen et al., were identified in a country-wide survey of neurological complications after regional blockade, between 1990 and 1999, in Sweden [31]. Both of these patients were severely affected by HELLP syndrome, with apparent signs of coagulopathy. To the best of our knowledge, there are no confirmed case reports of neuraxial hematoma after regional anesthesia in thrombocytopenic parturients who otherwise showed no clinical signs of impaired hemostasis.

As the incidence of neuraxial hematoma after regional anesthesia is very rare, it is difficult to design a prospective and randomized study to determine the lowest platelet count at which anesthesiologists can safely administer regional anesthesia in obstetric patients. Hence it is necessary to rely on the cumulative experience of case and series reports to build a strong body of evidence as to the best clinical practice. Based on our review of the English language literature, six retrospective studies of regional anesthesia in thrombocytopenic parturients were identified (Table III).

Rolbin et al. evaluated the platelet counts of 686 healthy non-pregnant patients of both genders, and 2,204 pregnant women [32]. In this study, seven obstetric patients had platelet counts < $100 \times 10^9.L^{-1}$, and three of them received epidural anesthesia. One of these three patients had a platelet count between 75 x $10^9.L^{-1}$ and $99 \times 10^9.L^{-1}$, and two of them had platelet counts between $50 \times 10^9.L^{-1}$ and $74 \times 10^9.L^{-1}$. No clinically detectable neurological deficits were observed in this series.

Rasmus et al. reviewed the charts of 2,929 women who delivered in their facility over a period of six months [11]. In this study, 24 patients had a platelet counts less than $100 \times 10^9.L^{-1}$ during the peripartum period, of which 14 received regional anesthesia including 12 epidurals and two spinals. Among those with platelet counts between $50 \times 10^9.L^{-1}$ and $80 \times 10^9.L^{-1}$, five patients received epidurals, while in those with platelet counts less than $50 \times 10^9.L^{-1}$, four patients received regional anesthesia (two epidurals, and two spinals). One patient whose platelet count was $26 \times 10^9.L^{-1}$ received spinal anesthesia after a platelet transfusion. There were no neurological complications associated with the anesthesia.

Shaley et al. [12] assessed the safety of epidural anesthesia in 45 women with gestational thrombocytopenia with platelet counts between $50 \times 10^9.L^{-1}$ and $100 \times 10^9.L^{-1}$. In this study, 33 patients had platelet counts between $75 \times 10^9.L^{-1}$ and $100 \times 10^9.L^{-1}$, and 12 patients had platelet counts between $50 \times 10^9.L^{-1}$ and $75 \times 10^9.L^{-1}$. None of the patients developed clinically significant sequelae from the epidural anesthesia during or over a six-day follow-up.

Beilin et al. reported a retrospective chart review of all parturients at their institution who had platelet counts less than $100 \times 10^9.L^{-1}$ during the peripartum period from March 1993 to February 1996 [33]. During this period, 15,919 women delivered in their facility, and 80 women were found to have platelet counts less than $100 \times 10^9.L^{-1}$, of which 30 patients had epidural anesthesia (the platelet count range in these patients was between $69 \times 10^9.L^{-1}$ and $98 \times 10^9.L^{-1}$). They found no documentation of neurological complications in any of these patients.

Webert et al. analyzed the obstetrical management of 119 pregnancies with ITP followed at their institution over an 11-

Table III – Thrombocytopenic Term Parturients and Regional Anesthesia

Author/Country, Year	Number of patients: Platelet count $< 100 \times 10^9.L^{-1}$ N	Regional anesthesia: Platelet count 50-100 $\times 10^9.L^{-1}$: Epidural N	Spinal N	Total N	Regional anesthesia: Platelet count $< 50 \times 10^9.L^{-1}$ N	Anesthetic Complications N	Comments
Rolbin et al.[32] Canada, 1988	7	3	0	3	0	0 / 3	2 patients with platelet count between 50 – 75 $\times 10^9.L^{-1}$ received regional.
Rasmus et al.[11] USA, 1989	24	10	0	10	4[#]	0 / 14	[#]One patient received platelet transfusion before spinal. 5 patients with platelet count between 50 - 80 $\times 10^9.L^{-1}$ received regional.
Shalev et al.[12] Israel, 1996	45	45	0	45	0	0 / 45	Only the patients with gestational thrombocytopenia were included in the study. 12 patients received regional with platelet count between 50 – 75 $\times 10^9.L^{-1}$.
Beilin et al.[33] USA, 1997	80	30	0	30	0	0 / 30	No information on the number of patients with platelet count between 50 - 80 $\times 10^9.L^{-1}$
Webert et al.[13] Canada, 2003	?	25	0	25	1	0 / 26	Only ITP[=] patients were included in the study. 2 patients with platelet count between 50 - 75 $\times 10^9.L^{-1}$ received regional.
Frenk et al.[14] USA, 2005	177	133	33	166	4[¨]	0 / 170	[¨]All patients received platelet transfusion before regional. 6 patients with platelet count between 50 - 60 $\times 10^9.L^{-1}$ received regional.
Tanaka et al. Canada, 2008	75	30	17	47	0	0 / 47	Preeclampi patients excluded. 13 patients with platelet count between 50-80 $\times 10^9.L^{-1}$ received regional.
Total	408+	276	50	326	9	0 / 335	

ITP - Immune thrombocytopenic purpura.

year period [13]. In this analysis, epidural anesthesia was performed in 42 parturients. Within this group, 16 women had platelet counts more than $100 \times 10^9.L^{-1}$, 19 women had platelet counts between $76 \times 10^9.L^{-1}$ and $100 \times 10^9.L^{-1}$, six women had platelet counts between $50 \times 10^9.L^{-1}$ and $75 \times 10^9.L^{-1}$, and one had a platelet count less than $50 \times 10^9.L^{-1}$. No patient had complications related to the placement of an epidural catheter.

A similar review was carried out by Frenk et al., who reviewed the medical records of parturients presenting at their institution with platelet counts $< 100 \times 10^9.L^{-1}$ between 1997 and 2002 [14]. One hundred and seventy-seven patients were identified, and 170 of them received regional anesthesia for either vaginal or cesarean delivery. Of the parturients with platelet counts between $60 \times 10^9.L^{-1}$ and $100 \times 10^9.L^{-1}$, 29 received spinal anesthesia and 131 received epidural anesthesia. In the parturients with platelet counts between $50 \times 10^9.L^{-1}$ and $60 \times 10^9.L^{-1}$, four received spinal anesthesia and two received epidural anesthesia, while in those with platelet counts less than $50 \times 10^9.L^{-1}$, four parturients received regional anesthesia only after receiving platelet transfusions. No neurological complications were documented in any of the patients reviewed.

In addition to these six series, we have identified two case reports of uneventful epidural anesthesia in the presence of significant thrombocytopenia. One of the cases had a platelet

count of $4 \times 10^9.L^{-1}$, and was diagnosed with Evans' syndrome after delivery [34]. The other case was found to have ITP, and her platelet count was $26 \times 10^9.L^{-1}$ after the induction of epidural anesthesia [35].

The main reasons for pregnancy-associated thrombocytopenia, defined as a platelet count $< 150 \times 10^9.L^{-1}$, include gestational thrombocytopenia (74%), hypertensive disorders of pregnancy (preeclampsia) (21%) and ITP (3%) [2]. Platelet disorders in gestational thrombocytopenia and ITP are considered static [20], with stable platelet counts and preserved platelet function [4]. On the other hand, the disorder in preeclampsia is dynamic. The platelet counts of these patients may fall within a short period of time, and platelet function can be impaired [36-38]. Since these two conditions exhibit different patterns with respect to the function of platelets, we excluded the patients with preeclampsia in our study. We believe that preeclamptic patients need different guidelines as to the minimum platelet count for regional anesthesia.

As previously highlighted, the incidence of neurological complications from regional anesthesia as a consequence of thrombocytopenia is extremely rare in obstetric patients. We usually rely on the platelet count to determine if regional anesthesia is feasible or not. Ideally, however, we should be able to evaluate not only the platelet count but also the platelet function, prior to a regional procedure, although this is difficult to do. Platelet aggregometry and flow cytometry are not practical tests because they are time-consuming and require technical expertise [39]. The in vivo bleeding time (BT) is no longer regarded as a reliable test for clinical bleeding because it does not necessarily reflect the risk of bleeding at other sites [40], and there is also a wide variation among observers [41]. Currently, two bedside instruments are available to evaluate platelet function: the thromboelastogram (TEG) and the platelet function analyser (PFA-100).

Orlikowski et al. [10] studied the platelet count, BT and TEG parameters of normal pregnant patients and 49 patients with preeclampsia, and concluded that the platelet function remained normal until the platelet count decreased to $54 \times 10^9.L^{-1}$ (95% confidence limits 40 to $75 \times 10^9.L^{-1}$).

Vincelot et al. [42] measured the platelet function in normal pregnancy, in patients with thrombocytopenia of pregnancy and in patients with preeclampsia using the PFA-100 analyser. According to their results, the platelet function in patients with gestational thrombocytopenia may be preserved when the platelet count is as low as $60 \times 10^9.L^{-1}$.

Although these studies are important, and constitute further supporting evidence of normal hemostasis in patients with thrombocytopenia, their sample sizes were very small and, hence, no definitive conclusions can be drawn regarding the platelet function of parturients with thrombocytopenia.

Wee et al. recently conducted a nation-wide survey of the practice of neuraxial anesthesia related to coagulation problems in the 264 obstetric units in the UK [43]. They found that in parturients with ITP and platelet counts between $80 \times 10^9.L^{-1}$ and $100 \times 10^9.L^{-1}$, 64 to74% of the units performed regional anesthesia; in those with platelet counts between $50 \times 10^9.L^{-1}$ and $79 \times 10^9.L^{-1}$, 22 to 31% of the units performed regional anesthesia; and in those with a platelet count below $50 \times 10^9.L^{-1}$, 4 to 9% of the units performed epidural anesthesia. This report is very much in keeping with our results, in which most of the parturients with platelet counts more than $80 \times 10^9.L^{-1}$ received regional anesthesia, while only 48.1% of those with platelet counts between $50 \times 10^9.L^{-1}$ and $79 \times 10^9.L^{-1}$ were administered regional.

Based on the combination of these six retrospective studies, two case reports and our own results, a total of 328 patients, with platelet counts between $50 \times 10^9.L^{-1}$ and $100 \times 10^9.L^{-1}$, who received regional anesthesia without bleeding complications, have been documented. Although each publication stratified patients in a different way, it is clear that at least 40 of those patients had platelet count between 50 and $80 \times 10^9.L^{-1}$ (Table III). We believe that there is enough evidence in the literature to support a move towards lowering the safe cut-off value of platelet counts for the practice of regional anesthesia in patients who do not exhibit signs of abnormal bleeding in the presence of non-preeclamptic thrombocytopenia.

In addition, current guidelines published by the British Society for Haematology in 2003 state that asymptomatic ITP patients with platelet counts $> 20 \times 10^9.L^{-1}$ do not require treatment until delivery is imminent, and platelet counts $> 50 \times 10^9.L^{-1}$ are regarded as safe for both vaginal delivery and cesarean delivery [44]. Similarly, we propose the safe lower threshold of platelet count for the administration of regional anesthesia in non-preeclamptic parturients should be $50 \times 10^9.L^{-1}$, since this group of patients is stable without any impairment of platelet function.

Our study was limited by its retrospective nature, as a result of which the anesthetic management was dictated by the attending anesthesiologist, and also the platelet function tests were unavailable in any of these patients prior to their delivery. Future publications of additional series of patients receiving regional anesthesia in the context of thrombocytopenia in pregnancy will help to build up a larger database to solidify our recommendation. In addition, further studies exploring the use of bedside platelet function testing to identify patients with normal coagulation in the presence of thrombocytopenia will help anesthesiologists make better decisions about the safe use of regional anesthesia in this subset of patients.

REFERÊNCIAS — *REFERENCES*

01. Boehlen F, Hohfeld P, Extermann P et al. — Platelet count at term pregnancy: a reappraisal of the threshold. Obstet Gynecol, 2000;95:29-33.
02. Burrows RF, Kelton JG — Fetal thrombocytopenia and its relation to maternal thrombocytopenia. N Engl J Med, 1993;329:1463-1466.

03. Douglas MJ — The Use of Neuraxial Anesthesia in Parturients with Thrombocytopenia: What Is an Adequate Platelet Count? em: Halpern SH, Douglas MJ — Evidence-Based Obstetric Anesthesia. BMJ Books: Blackwell Publishing, 2005:165-177.
04. Warkentin TE, Kelton JG — Management of Thrombocytopenia, em: Colman RW, Hirsh J, Marder VJ et al. - Hemostasis and Thrombosis: Basic Principles and Clinical Practice, 3rd Ed, Philadelphia, Lippincott, 1994;470.
05. Hawkins JL, Koonin LM, Palmer SK et al. — Anesthesia-related deaths during obstetric delivery in the United States, 1979-1990. Anesthesiology, 1997;86:277-284.
06. Cousins MJ, Bromage PR — Epidural Neural Blockade, em: Cousins MJ, Bridenbaugh PO — Neural Blockade in Clinical Anesthesia and Management of Pain, 2nd Ed, Philadelphia, JB Lippincott, 1988;335-336.
07. Letsky EA — Haemostasis and epidural anaesthesia. Int J Obstet Anesth, 1991;1:51-54.
08. Douglas MJ — Platelets, the parturient and regional anesthesia. Int J Obstet Anesth, 2001; 10:113-120.
09. American College of Obstetricians and Gynecologists Practice Bulletin No. 36. Obstetric analgesia and anesthesia. Obstet Gynecol, 2002;100:177-191.
10. Orlikowski CEP, Rocke DA, Murray WB et al. — Thromboelastography changes in pre-eclampsia and eclampsia. Br J Anaesth, 1996;77:157-161.
11. Rasmus KT, Rottman RL, Kotelko DM et al. — Unrecognized thrombocytopenia and regional anesthesia in parturients: A retrospective review. Obstet Gynecol, 1989;73:943-946.
12. Shaley O, Anteby E — Epidural anesthesia can be safely performed in gestational thrombocytopenia of > 50,000/mL. Blood, 1996;88 (suppl.):62b.
13. Webert KE, Mittal R, Sigouin C et al. — A retrospective 11-year analysis of obstetric patients with idiopathic thrombocytopenic purpura. Blood, 2003;102:4306-4311.
14. Frenk V, Camann W, Shankar KB — Regional anesthesia in parturients with low platelet counts. Can J Anaesth, 2005; 52:114.
15. American College of Obstetricians and Gynecologists Practice Bulletin No. 33. Diagnosis and management of preeclampsia and eclampsia. Obstet Gynecol, 2002;99:159-167.
16. American College of Obstetricians and Gynecologists Practice Bulletin No. 29. Chronic hypertension in pregnancy. Obstet Gynecol, 2001;98:177-185.
17. Vandermeulen EP, Van Aken H, Vermylen J — Anticoagulants and spinal-epidural anesthesia. Anesth Analg, 1994;79:1165-1177.
18. Ruppen W, Derry S, McQuay H et al. — Incidence of epidural hematoma, infection, and neurologic injury in obstetric patients with epidural analgesia/anesthesia. Anesthesiology, 2006;105: 394-399.
19. Loo CC, Dahlgren G, Irestedt L — Neurological complications in obstetric regional anaesthesia. Int J Obstet Anesth, 2000;9:99-124.
20. Beilin Y, Abramovitz S — The anticoagulated parturient. Int Anesthesiol Clin, 2007;45:71-81.
21. Ballin NC — Paraplegia following epidural analgesia. Anaesthesia, 1981;36:952-953.
22. Newman B — Postnatal paraparesis following epidural analgesia and forceps delivery. Anaesthesia, 1983;38:350-351.
23. Crawford JS — Some maternal complications of epidural analgesia for labour. Anaesthesia, 1985;40: 1219-1225.
24. Roscoe MW, Barrington TW — Acute spinal subdural hematoma. A case report and review of literature. Spine, 1984;9:672-675.
25. Jaeger M, Rickels E, Schmidt A et al. — Lumbar ependymoma presenting with paraplegia following attempted spinal anaesthesia. Br J Anaesth, 2002;88:438-440.
26. Esler MD, Durbridge J, Kirby S — Epidural haematoma after dural puncture in a parturient with neurofibromatosis. Br J Anaesth, 2001;87:932-934.
27. Lao TT, Halpern SH, MacDonald D et al. — Spinal subdural haematoma in parturient after attempted epidural anaesthesia. Can J Anaesth, 1993;40:340-345.
28. Yuen TST, Kua JSW, Tan IKS — Spinal haematoma following epidural anaesthesia in a patient with eclampsia. Anaesthesia, 1999;54:350-354.
29. Yarnell RW, D'Alton ME — Epidural hematoma complicating cholestasis of pregnancy. Curr Opin Obstet Gynecol, 1996;8:239-242.
30. Scott DB, Hibbard BM — Serious non-fatal complications associated with extradural block in obstetric practice. Br J Anaesth, 1990;64:537-541.
31. Moen V, Dahlgren N, Irestedt L — Severe neurological complications after central neuraxial blockades in Sweden 1990-1999. Anesthesiology, 2004;101:950-959.
32. Rolbin SH, Abbott D, Musclow E et al. — Epidural anesthesia in pregnant patients with low platelet counts. Obstet Gynecol, 1988;71:918-920.
33. Beilin Y, Zahn J, Comerford M — Safe epidural analgesia in thirty parturients with platelet counts between 69,000 and 98,000 mm^{-3}. Anesth Analg, 1997;85:385-388.
34. Hew-Wing P, Rolbin SH, Hew E et al. — Epidural anaesthesia and thrombocytopenia. Anaesthesia, 1989;44:775-777.
35. Moeller-Bertram T, Kuczkowski KM, Benumof JL — Uneventful epidural labor analgesia in a parturient with immune thrombocytopenic purpura and platelet count of 26,000/mm^3 which was unknown preoperatively. J Clin Anesth, 2004;16:51-53.
36. Kelton JG, Hunter DJS, Neame PB — A platelet function defect in preeclampsia. Obstet Gynecol, 1985;65:107-109.
37. Sharma SK, Philip J, Whitten CW et al. — Assessment of changes in coagulation in parturients with preeclampsia using thromboelastography. Anesthesiology, 1999;90:385-390.
38. Davies JR, Fernando R, Hallworth SP — Hemostatic function in healthy pregnant and preeclamptic women: an assessment using the platelet function analyzer (PFA-100®) and thromboelastograph®. Anesth Analg, 2007;104:416-420.
39. Kam PCA, Thompson SA, Liew ACS — Thrombocytopenia in the parturient. Anaesthesia, 2004;59:255-264.
40. Lind SE — The bleeding time does not predict surgical bleeding. Blood, 1991;77:2547-2552.
41. O'Kelly SW, Lawes EG, Luntley JB — Bleeding time: Is it a useful tool? Br J Anaesth, 1992;68:313-315.
42. Vincelot A, Nathan N, Collet D et al. — Platelet function during pregnancy: an evaluation using the PFA-100 analyser. Br J Anaesth, 2001;87:890-893.
43. Wee L, Sinha P, Lewis M — Central nerve block and coagulation: a survey of obstetric anaesthetists. Int J Obstet Anesth, 2002;11:170-175.
44. British Committee for Standards in Haematology General Haematology Task Force. Guidelines for the investigation and management of idiopathic thrombocytopenic purpura in adults, children and pregnancy. Brit J Haematol, 2003; 120:574-596.

SUMARIO

Tanaka M, Balki M, McLeod A, Carvalho JCA – Anestesia Regional y Trombocitopenia no preclámptica; es hora de pensar de nuevo sobre el nivel seguro de plaquetas.

JUSTIFICATIVA Y OBJETIVOS: *A pesar de que la anestesia regional esté siendo muy utilizada en el control del dolor en obstetricia, su uso puede no ser muy apropiado en las pacientes con trom-*

bocitopenia, debido al riesgo de hematoma en el neuro eje. No existen fuertes evidencias que sugieran un número mínimo de plaquetas necesario para garantizar la seguridad en la realización de la anestesia regional. El objetivo de este estudio fue analizar la seguridad de la anestesia regional en pacientes con trombocitopenia no preeclámptica en la institución durante un período de cinco años.

MÉTODO: *Fue realizada revisión retrospectiva de las historias clínicas médicas de todas las pacientes obstétricas no preeclámpticas cuyo parto fue realizado en la institución entre abril de 2001 y marzo de 2006 y que presentaron < 100 x $10^9.L^{-1}$ de plaquetas el día de la anestesia. La etiología de la trombocitopenia, el tipo de anestesia, tipo de parto y las principales complicaciones anestésicas fueron registrados.*

RESULTADOS: *Se identificaron 75 pacientes, de las cuales 47 (62,2%) recibieron anestesia regional. La etiología de la trombocitopenia incluyó púrpura trombocitopénica inmune en 49 pacientes, trombocitopenia de gestación en 20 pacientes, y otras causas en seis pacientes. La anestesia regional fue utilizada en un 91.9% de las pacientes con nivel de plaquetas entre 80 a 99 x $10^9.L^{-1}$ y en 48.1% de las pacientes con nivel de plaquetas entre 50 y 79 x $10^9.L^{-1}$. Ninguna de las 11 pacientes que presentaban plaquetas por debajo de 50 x $10^9.L^{-1}$ recibió anestesia regional. No hubo complicaciones neurológicas.*

CONCLUSIONES: *En los casos estudiados, la anestesia regional fue administrada con seguridad en las gestantes con nivel de plaquetas entre 50 - 79 x $10^9.L^{-1}$. En este estudio los resultados son similares a los de otras series relatadas en la literatura. Sugerimos que en las pacientes sin eclampsia y con un nivel estable de plaquetas, y sin historial previo o señales clínicos de sangramiento, el límite inferior de 50 x $10^9.L^{-1}$ debe ser usado.*