Epidemiology and morbidity of regional anaesthesia in children : a follow-up one-year prospective survey of the French-Language Society of Paediatric Anaesthesiologists (ADARPEF)

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Pediatric Anesthesia

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Journal:	*Pediatric Anesthesia*
Manuscript ID:	PAN-2010-0266.R2
Manuscript Type:	Original Paper
Date Submitted by the Author:	28-Sep-2010
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Key Words:	Audit, Complications, Regional anesthesia

Epidemiology and morbidity of regional anaesthesia in children: a follow-up one-year prospective survey of the French-Language Society of Paediatric Anaesthesiologists (ADARPEF)

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Running title: Epidemiology and morbidity of regional anaesthesia in children

No conflict of interest

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Summary

Background: The ADARPEF (French-Language Society of Paediatric Anaesthesiologists) designed a one-year prospective, multicenter and anonymous study in order to update both epidemiology and morbidity of regional anaesthesia in children.

Methods: From November 2005 to October 2006, data from participating hospitals were recorded using an identification form, a data recording form and a complication form. Information collected included the characteristics of the hospitals, the number and type of regional anaesthetics, the age of the involved children as well as the incidence and type of complications.

Results: Data collected in 47 institutions included 104,612 pure general anaesthesias, 29,870 general anaesthesias associated with regional blocks and 1,262 pure regional blocks. Central blocks accounted for 34 % of all RA. Peripheral blocks (66 %) were upper or lower limb blocks (29 % of peripheral blocks), trunk and face blocks (71 %). In children aged ≤ 3 yr, the percentage of central blocks was similar to the peripheral ones (45% versus 55), while in older children, peripheral blocks were more than four times used than peripheral ones. Complications (41 involving 40 patients) were rare and usually minor. They did not result in any sequelae. The study revealed an overall rate of complication of 0.12%; CI 95% [0.09-0.17], significantly 6 times higher for central than for peripheral blocks.

Conclusions: Due to the low rate of complications, regional anaesthetic techniques have a good safety profile and can be used in order to provide postoperative analgesia. In addition, the results should encourage anaesthesiologists to continue to use peripheral instead of central (including caudal) blocks as often as possible when appropriate.

Key words: Pediatrics: children; Regional anesthesia: epidemiology, complications

Introduction

In 1996, the ADARPEF (French-Language Society of Paediatric Anaesthesiologists) published a 1 yr prospective study evaluating the importance and the incidence of complications of regional anesthetics (RA) in pediatrics [1]. The study collected data from 24,409 regional blocks including 60% of central blocks (mainly caudal). Complications were rare (00.9%), minor and all resulting from central blocks. Accordingly, the authors encouraged anaesthesiologists to preferentially perform peripheral nerve blocks when appropriate.

Twelve years later, the ADARPEF saw a need to design a second study providing practitioners with an updated understanding of both the epidemiology and the morbidity of RA in children.

Methods

The ADARPEF board developed a 1 yr multicenter, anonymous, prospective and observational study based on data collected from 3 separate forms provided to participating hospitals: one for identification, a 2nd for details, and a 3rd for complications. A senior exclusive paediatric anaesthesiologist whose topic was RA was established as coordinator. A senior paediatric anaesthesiologist ($\geq$ 50% activity in children) was established to the local person with responsibility in each participating hospital.

Identification

The local responsible used the identification to describe the characteristics of his hospital, particularly administrative affiliation (public, private, university, teaching...), number of

pediatric beds, geographical location. As soon as it was completed, the form was sent to coordinator who used it to give each hospital an ID number.

Epidemiology

The epidemiological study took place in four steps:

(i) Step 1: in each participating hospital, each anaesthesiologist provided extemporaneous details from each patient he anesthetized.

(ii) Step 2: the local coordinator recorded overall data on an electronic form with the ID number separating pure GA, RA associated with GA and isolated RA. RA was assigned to a central blocks group including spinals and epidurals (caudal, sacral, lumbar, thoracic) or in a peripheral nerve blocks group. Catheter placements were identified in each group. Patients were classed into 7 age groups: ex-preterm aged < 1 mo; full- term aged < 1 mo, ex- preterm aged l-6 mo, full-term aged l-6 mo, infants and toddlers aged 6 mo-3 yr, children aged 6-12 yr, adolescents aged 12-18 yr.

(iii) Step 3: the coordinator was sent the details forms monthly. He used the ID number to check and classify the data before entering the whole in a database hiding the ID numbers. In this way, data became anonymous for everybody.

(iv) Step 4: overall results were analysed.

Morbidity

Morbidity was studied 1 yr long on the basis of outcome. Any adverse event was reported by the practitioner(s) caring for the patient using a form with the ID number of the hospital, the patient being unidentified. The coordinator received the form and was the only one able to identify the hospital using the ID number. The form described the technique and equipment used, the type of drug and the administered dose, the specific of the adverse event, the management and the patient outcome, including neurological and medico-legal implications if relevant. Parents of children discharged the day of surgery received a call the next day and/or

were requested to phone the anaesthesiologist in case of any disturbing symptom. Hospitalized children were followed up daily until discharge. When a symptom persisted on discharge, one (or more) specific consultation, per example with a neurologist if there was a neurological deficit, was organized to assess the evolution, the coordinator being sent he complication form either when full recovery was found or at the end of 1 yr.

Analysis

Results are calculated as percentages of overall RA and given in terms of anaesthetics rather than in terms of patients. Upper 95% confidence bound (CI 95%) was used each time that necessary. In case of comparison, $P < 0.05$ was considered significant.

Results

Identification

The study involved 47 hospitals: 37 university hospitals, 6 non-university public hospitals, and 4 private hospitals. The size of the hospitals varied from 100 to 2000 beds including 25 to 400 paediatrics beds. Thirty-nine facilities were located in France, 3 in Belgium, and 1 each in Canada, Italy, Switzerland and Tunisia. Forty-one hospitals included a specific paediatric department, whereas 6 hospitals treated children and adults together in the same unit.

Epidemiology

From November 2005 until October 2006, data from 135,744 paediatric anaesthesia, including 104,612 pure GA and 31,132 RA (29,870 associated with GA and 1,262 isolated) were collected prospectively. Table 1 presents different RA according to patient's age.

Central blocks represented 34 % of all RA (table 2), increasing to 45 % in children aged < 3 yr. Caudal blocks represented 80 % of all central blocks, lumbar epidurals 11%, spinals and thoracic epidurals 3% each, while "others" were mainly epidural catheters surgically inserted,

combined spinal/epidural RA and few staged segmental RA.

Peripheral blocks represented 66 % of RA. Upper limbs blocks accounting for 10% of peripheral were mainly axillary (43% of all upper limb blocks), fingers (13%), and infraclavicular (11 %) blocks, while "others" were isolated medial or radial, interdigital, posterior or anterior interosseous and posterior ulnar blocks (table 3). Lower limbs blocks accounting for 19% of peripheral were femoral (20 % of all lower limb blocks), ilio-fascial (16%), posterior popliteal sciatic (15%) and lateral sciatic (12%) blocks, while "others" were mainly blocks of toes, posterior tibial and saphenous blocks (table 4). Trunk and face blocks consisted mainly of ilio-inguinal (37% of all trunk and face blocks), penile (35%) and pudendal nerve blocks while face blocks included 1,118 blocks (5%) of nerves supplying head and neck, mainly infraorbital nerve block for cleft palate repair, the remaining being mainly subtenon, retrobulbar, auricular and laryngeal (table 5).

The study recorded 2726 (9% of all RA) catheter placements (table 6). No data on duration of use of catheters or on their possible home use was collected. Placements concerned 23% of lower limbs blocks (mainly popliteal sciatic and psoas compartmental), 15% of central blocks (a catheter being inserted in 88% of lumbar/thoracic epidurals, 71% of sacrals, 1% of caudals, and 0.8% of spinals), 6% of upper limbs blocks (mainly axillary), and 1% of trunk and face blocks, (mainly thoracic paravertebral).

Local anaesthetics used in this study were ropivacaine 85%, bupivacaine 8%, lévobupivacaine 4%, mepivacaine 2% and lidocaine 1%. Mepivacaine and lidocaine were used only in peripheral blocks. Spinal anaesthesia was performed mainly with hyperbaric bupivacaine.

Morbidity

One hundred and seventy five complications forms were collected. Most concerned central blocks (n=112, 64%). One hundred and thirty four were eliminated as inappropriate, including

positive test-doses, missing in localisation or puncture, blood reflux through needles or catheters, subcutaneous injections without lesions, catheters inadvertently removed, folded or capped, inefficient blocks accessed by increase in heart rate at surgical incision, urinary retention, and one complaint 6 months after a femoral blockade with motor block of three days duration not diagnosed despite a 2 days post operative follow-up in ward... At the end, 41 forms involving 40 patients were validated. They occurred mostly in the operating theater. No one resulted in either sequelae or harm 1 yr later. Their incidence was 0.12% (CI 95% = 0.09-0.17). After upper extremity and facial blocks (unable to be an alternative to central blocks) had been subtracted from peripheral RA for a valid comparison, the incidence was founded significantly higher for central (0.29%; CI 95% = 0.21-0.43) than for peripheral RA (0.29%; CI 95% = 0.03-0.10) Table 7 presents age-group distribution of complications. The incidence was significantly higher in the low age group (0.4% in 3,860 infants aged < 6 months versus 0.1% in 27, 272 children aged > 6 months). No complication was directly related to the use of wrong equipment. No medico-legal concern was recorded. The incidence of complications directly related to the use of catheters is 0.14% versus 0.13% in techniques without catheter.

One patient (11.5 yr) had two complications related with multiple attempts at performing a lumbar epidural. Two complications forms were completed: the first form reported an unrecognised dural tap while the second form reported a total spinal anaesthesia following the local anaesthetic (LA) injection through the lumbar catheter. Total spinal was recognized in recovery room because the patient was unable to breathe spontaneously. The patient did not experience any other disability. Controlled ventilation continued, the recovery was uneventful 4 h later.

Two 2 ex-preterm (1 and 3 months respectively) had an inadvertent extension of a spinal anaesthetic, both due to a rising of their lower limbs during operative installation,

immediately recognized and resulting in isolated apnoea requiring controlled ventilation < 12 h long without sequelae.

In terms of toxicity, convulsions occurred in 1 not anesthetised patient (9 yr) given an axillary single shot of ropivacaine in a normal dose (aspiration test negative, test dose not done). Recovery was full under classical pharmacological treatment, i.e. oxygen by face mask and 4mg/kg thiopental. Plasma level of LA was not performed. The surgery (fracture reduction) was done.

Fifteen patients (age ranged from 1.5 mo to 17 yr) underwent cardiac toxicity of LA (0.05%; CI 95% 0.03-0.08). The involved blocks were 1 axillary, 6 single shot and 1 continuous caudals, 1 penile + ilio-inguinal, 4 lumbar and 2 thoracic epidurals. LA was ropivacaine (5 cases) or bupivacaine (10 cases), given in adequate doses were except 1 drug error, 0.75% ropivacaine caudally given instead of 0.2% details (aged 21 mo). Injections consisted of 9 single shots through a needle, 4 primary and 2 secondary injections through a catheter. A test dose with epinephrine was performed and considered uneventful in 6 patients. Specifics were either single changes in electrocardiogram (2 patients) or transient arrhythmias (13 patients including 1 bradycardia in a 8 yr old boy given both penile and ilio-inguinal blocks in combination). No one required active treatment. Plasma levels of LA were not performed.

In terms of trauma, 2 patients (6 mo and 3 yr respectively) scheduled for one day surgery underwent an ilio-inguinal block resulting in colonic puncture. They recovered without sequelae after watching, fasting, fluids, and antibiotics in ward.

Ten dural taps (0.10%; CI 95% = 0.05-0.19) were recorded (age ranged from 1 mo to 13 yr, the one previously reported in association with an inadvertent total spinal being excluded). Six of them occurred during caudal blocks in babies, 3 during lumbar and 1 during thoracic epidurals. No post-dural puncture headache was noted and preventive analgesia was given in 4 patients only.

Five nerve injuries were suspected. The 1st one was an isolated Claude Bernard Horner syndrome catheter remaining 18 h after a thoracic epidural was stopped (aged 12 yr). The 2nd one was a deficit of the external popliteal nerve persisting 48 h after a lumbar epidural was stopped (aged 13 yr). The 3rd one consisted of tingling associated with hypoesthesia in the femoral area following an ilio-fascial block and disappearing for 48 h (aged 11 yr). The 4th one (aged 8 yr) consisted of unilateral tingling in one thigh during 3 weeks following a caudal that was noted as uneventful. The last one was a minor intermittent dorsal pain following a lumbar epidural and requiring intermittent paracetamol 11 mos long (aged 12 yr). All of them recovered fully without serious harm.

Four patients had a minor complication: one inflammation of a lumbar epidural puncture point locally treated (aged 2 yr), one ilio-inguinal block performed at the wrong side (aged 5.5 yr), one breakage of femoral catheter requiring removal under LA (aged 12 yr), one pleural displacement of a thoracic paravertebral catheter (aged 12 yr). The displacement was diagnosed because RA had become inefficient. No other signs were noted. The catheter was removed without other treatment.

Discussion

Regional anaesthesia represents 22% of all anaesthesias recorded by the study, similar to the incidence founded by the previous ADARPEF' study after removal of 5,306 local anaesthesias (Bier blocks, tracheal blocks, infiltrations, field blocks) that are not recorded by the current survey. That is also close to the incidence of 20 – 25% of RA founded in the whole population (adults/children together). Overall complications have the same low rate that found in the study 12 yrs ago (local anaesthesias recorded in the 1st ADARPEF' study being removed). In the same way, adverse effects are mainly related with central blocks; most of the blocks being performed under GA, the practitioners were deprived of clinical signs of

LA toxicity or of nerve injury.

One essential question concerns the accuracy of the data, particularly the reported complications. Some of them could be not recorded, whereas the occurrence of fatalities cannot be hidden. However, the coordinator was intensively connected to each local responsible, phoning or e-mailing him whenever he had doubts. Several anaesthesiologists collected the data at the same time in the same hospital, inevitably adding a mutual review to the double control performed both by the local responsible and the coordinator. Despite an insignificant percentage of minor complications could have been missed after discharge, the procedure allows to regard overall data collection as efficient and to consider the risk of missing severe complications as almost non-existent.

Epidemiology

The widespread geographical distribution of the hospitals involved in the study is representative of the French paediatric anaesthesia in private and public hospitals. The significant amount of data illustrates clearly a transition in practice from predominantly central block to an increased number of peripheral nerve blocks including catheter techniques. Since the previous ADARPEF study, the overall incidence of central blocks has decreased dramatically, collapsing even in children aged < 3 years (however the group of age undergoing central blocks most frequently), while the incidence of peripheral blocks increased strongly. Trunk blocks represent their largest part, characterized by the emergence of techniques that were not clearly identified by the previous ADARPEF study (ilio-inguinal, para-umbilical, pudendal, thoracic and lumbar paravertebral blocks). Facial blocks are a new and widely used practice for facial and reconstructive surgery, particularly in cleft lip repair [2].

The study records a significant number of catheter placements, in central as well in peripheral RA, most of them being neuraxial. Indeed, neuraxial continuous epidural analgesia

is one of the best techniques to obtain pain relief in children (particularly postoperative pain relief in younger). Perineural catheters became usual practice, first in hip and foot surgery. Continuous peripheral nerve blockade emerged as safe and effective in adults. Then several prospective studies demonstrated their benefits after orthopaedic procedures in children. In 2001, placement of a brachial plexus catheter for pain control was far less common in children than in adults [3]. Today, peripheral blocks allow to provide postoperative pain relief in the greatest part of orthopaedic surgery using RA techniques [4-6], and to treat complex regional pain syndrome in adolescents [7].

These results confirm a retrospective report from a single institution (10,929 RA performed on a 17 yr period) revealing both a dramatic decrease of central blocks, and the emergence of continuous postoperative analgesia via perineural catheters [8], peripheral blocks emerging as routine practice in children at the end of the 90's following both peer recommendations [1] and evolution of devices.

Morbidity

Previous case reports of spinal cord injury resulting from thoracic epidural [9], sacral osteomyelitis [10] and bowel traumas requiring surgery resulting from ilio-inguinal blocks [11; 12] revealed that RA in children is not without risk, even in case of peripheral blocks. The study founds that complications are rare, most often requiring extra observation or minor treatment. Most of them occur early in the operating theater. No complications were as a result of equipment failure. Only one child includes pathologies lasting months, requiring a treatment and/or having a major impact both on child's physical and emotional status and on the quality of life of family. Neurologic deficits have good outcome in children as previously reported [13; 14]. As reported by literature, complications are more frequent (4 times in the current study) in children aged < 6 months that in children aged > 6 months, despite the fact that the youngest patients are probably managed by the most experienced paediatric

anaesthesiologists with maximal precautions. Moreover, this study has confirmed the low complications rate despite the performance of 96% on general anaesthesia or heavy sedation; indeed, due to the significant differences between children and adults with respect to self-control and the ability to communicate effectively, the usual recommendation is that general anaesthesia or heavy sedation should not be considered an absolute contraindication to regional anaesthesia in children (15).

Central RA has the highest incidence of complications (7 times higher that peripheral). The incidence remains low despite an increase since the 12 last years. Complications never reach the severity founded by a UK audit [16] on paediatric epidurals (10,633 epidurals performed for 5 yr) reporting permanent residual neurologic deficit in a child aged 3-mo (1-yr follow-up), 2 epidural abscesses, 1 meningism, 1 post-dural puncture headache requiring active blood patching, 1 drug error resulting in cauda equina syndrome and 5 severe neuropathy/radiculopathy resolved over a period of 4-10 mo using a pharmacological therapy in a Pain Clinic. It is difficult to explain this difference of severity in complications, excepted by the longer duration and the many more cases of the UK survey, i.e. 1,500 versus 10,000. The study records a very low overall morbidity of peripheral RA, almost 6 times lower that in central RA. Despite 2 colonic punctures, that should encourage anaesthesiologists to use peripheral rather than neuraxial (including caudal) blocks as often as possible when appropriate.

The use of catheters does not seem to increase the occurrence of complications, even if considering that the cardiac toxicity following a secondary injection through a catheter could be due to an inadvertent displacement of the catheter.

LA toxicity, resulting in 1 case of convulsions only while the UK survey reported 2 respiratory arrests and 1 seizure, did not require lipid treatment as reported in a child [17].

Some complications (at less drug error, wrong side, lower limbs raising resulting in

extended spinal anaesthesics, drug error and a part of cardiac toxicity) were avoidable. It is thus possible to improve the safety of paediatric RA provided basic precautions are followed.

Conclusion

This survey involving a large population shows that the importance of RA in pediatrics is unchanged for 12 yr, but that a clear transition in practice from central to peripheral blocks and continuous techniques has occurred. Some new techniques have emerged. The incidence of complications is almost unchanged and remains low, low age and central blocks increasing the risk. Most of the recorded complications were minor, occurred at the beginning of the procedure in the operating theatre, had a short duration and did not result in permanent harm. This safety profile means that RA remains an excellent way to provide postoperative analgesia, despite a risk of complications increasing in children aged < 3 yr. Anaesthesiologists must be encouraged to continue to choose peripheral instead of central blocks each time it is possible because a lower morbidity. A future ADARPEF' study should be designed for few years to assess the impact of ultrasonography on paediatric RA.

Acknowledgements

The authors acknowledge the enthusiasm and commitment of the centres involved in the survey : Amiens Hôpital Nord (university), Angers Hôpital Larrey (university), Antony Hôpital Privé (private), Besançon Hôpital Saint Jacques (university), Bordeaux Hôpital Pellegrin Enfants (university) and Polyclinique du Tondu (private), Bruxelles Cliniques Universitaires Saint Luc (Belgium) and Hôpital Reine Fabiola (Belgium), Caen Hôpital Femme-Enfant-Hématologie (university), Charleroi Hôpital Civil (Belgium), Clermont-Ferrand Hôtel Dieu (university), Genève Hôpital des Enfants (Switzerland), Grenoble Hôpital

Michalon (university), La Rochelle Hôpital Laennec (public), Le Havre Hôpital Jacques Monod (public), Lille Hôpital Jeanne de Flandre (university) and Hôpital Saint Vincent de Paul (private), Limoges Hôpital Dupuytren (university), Lyon Hôpital Femme-Mère-Enfant (university), Marseille Hôpital Privé Clairval (private) and Hôpitaux Timone enfants and Hôpital Nord (university), Montpellier Hôpital Lapeyronnie (university), Nancy Hôpital Brabois Enfants (university), Nantes Pôle Mère-Enfant (university), Nice Fondation Lenval (private) and Hôpital Archet (university), Orléans Hôpital Porte Madeleine (public), Paris Hôpital Armand Trousseau Hôpital du Kremlin-Bicêtre Hôpital Necker-Enfants Malades and Hôpital Saint-Vincent de Paul (universities), Pau Hôpital François Miterrand (public), Poitiers Pôle Femme-Mère-Enfant (university), Québec Centre Pédiatrique Laval (Canada), Reims Hôpital American Memorial Hospital (university), Rennes Hôpital Pontchaillou (university), Rouen Hôpital Charles Nicolle (university), Saint Brieuc Hôpital Y Le Foll (public), Saint-Etienne Hôpital Nord (university), Strasbourg Hôpital Hautepierre (university), Toulouse Hôpital Purpan (university), Tours Hôpital Clocheville (university), Tunis Hôpital d'Enfants (Tunisia), Turin Regina Marghertia Children's Hospital (Italy), Villeneuve Saint Georges Centre Hospitalier (public).

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Table 1: Different regional block procedures according to patient's age (n = 31,132)

Technique	0-30 days premature n = 121	0-30 days full term n = 475	1-6 mo premature n = 822	1-6 mo full term n = 2,442	6 mo – 3 yr n = 10,499	3-12 yr n = 12,974	> 12 yr n = 3,799	Total blocks	%
Epidurals	82	227	428	1,082	4,495	3,311	473	10,098	32.4
Spinals	9	9	38	40	43	60	188	387	1.3
Others central	0	0	0	4	1	23	43	71	0.3
Upper limbs	1	2	5	36	454	1,099	484	2081	6.7
Lower limbs	2	12	14	62	529	1,540	1,665	3,824	12.4
Trunk, abdomen	22	154	288	1,063	4,506	6,185	612	12,830	41
Face, head	5	71	49	155	471	756	334	1841	5.9

Table 2: Details of the different central blocks according to patient's age (n = 10,556)

Technique	0-30 days premature n = 121	0-30 days full term n = 475	1-6 mo premature n = 822	1-6 mo full term n = 2,442	6 mo – 3 yr n = 10,499	3-12 yr n = 12,974	> 12 yr n = 3,799	Total Blocks	%
Caudals	76	187	402	951	4,141	2,699	37	8,493	27.2
Sacral	0	2	1	4	12	35	4	58	0.2
Lumbar	5	33	18	93	240	450	344	1,183	3.8
Thoracic	1	5	7	34	102	127	88	364	1.2
Spinals	9	9	38	40	43	60	188	387	1.3
Others central	0	0	0	4	1	23	43	71	0.3

Table 3: Details of the different upper limb regional block according to patient's age (n = 2,081)

Technique	0-30 days premature n = 121	0-30 days full term n = 475	1-6 mo premature n = 822	1-6 mo full term n = 2,442	6 mo – 3 yr n = 10,499	3-12 yr n = 12,974	> 12 yr n = 3,799	Total Blocks	%
Parascalene	0	0	0	1	7	75	43	126	0.4
Infraclavicular	0	0	0	2	14	141	81	238	0.8
Axillary	0	0	2	10	158	543	188	901	2.9
Mild humeral	0	0	0	0	16	24	19	59	0.2
Ulnar	0	0	0	0	0	9	13	22	0.1
Wrist	0	0	0	4	49	56	27	136	0.4
Finger	0	1	0	9	119	104	37	270	0.9
Others	1	1	3	10	91	147	76	329	1

Table 4: Details of the different lower limbs block according to patient's age (n = 3,824)

Technique	0-30 days premature n = 121	0-30 days full term n = 475	1-6 mo premature n = 822	1-6 mo full term n = 2,442	6 mo – 3 yr n = 10,499	3-12 yr n = 12,974	> 12 yr n = 3,799	Total Blocks	‰
Psoas compartment	0	0	0	0	7	65	31	103	0.3
Femoral	0	0	1	5	46	291	413	756	2.4
Ilio-fascial	0	1	3	5	51	268	274	602	1.9
Parasacral	0	0	0	0	4	4	3	11	0.03
Sciatic Labat	0	0	0	1	12	18	15	46	0.1
Sciatic anterior	0	0	0	0	3	1	1	5	0.1
Sciatic subgluteal	1	1	0	5	11	30	29	77	0.2
Sciatic lateral	0	0	0	10	95	193	150	448	1.4
Sciatic posterior popliteal	0	0	0	6	98	215	273	592	1.9
Sciatic lateral popliteal	0	3	3	9	49	152	183	399	1.3
Ankle	0	1	0	0	5	13	17	36	0.1
Others	1	6	7	21	148	290	276	749	2.4

Table 5: Details of the different trunk and face blocks according to patient's age (n = 12,830)

Technique	0-30 days premature n = 121	0-30 days full term n = 475	1-6 mo premature n = 822	1-6 mo full term n = 2,442	6 mo – 3 yr n = 10,499	3-12 yr n = 12,974	> 12 yr n = 3,799	Total Blocks	%
Rectus sheath	9	70	54	215	328	460	88	1224	3.9
Ilio inguinal	12	73	225	750	1779	2462	203	5504	17.7
Penile	0	3	7	70	2015	2801	221	5117	16.4
Pudendal	1	2	2	19	343	410	59	836	2.7
Lumbar paravertebral	0	0	0	3	6	10	6	25	0.08
Thoracic paravertebral	0	1	0	3	24	28	25	81	0.3
Intercostal	0	5	0	3	11	14	10	43	0.1
Others (including facial blocks)	5	71	49	155	471	756	334	1841	5.9

Table 6: Details of the different blocks with catheter according to patient's age (n = 2,726)

Technique	0-30 days premature n = 121	0-30 days full term n = 475	1-6 mo premature n = 822	1-6 mo full term n = 2,442	6 mo – 3 yr n = 10,499	3-12 yr n = 12,974	> 12 yr n = 3,799	Total Blocks	%
Caudals	0	3	7	5	53	39	7	114	0.4
Sacral	0	2	0	4	12	23	1	42	0.1
Lumbar	5	28	15	83	216	368	303	1,108	3.5
Thoracic	1	5	5	32	100	116	82	341	1.1
Spinals	0	0	0	0	0	0	3	3	0.01
Others centrals	0	0	0	0	0	1	19	20	0.06
Parascalene	0	0	0	0	0	7	9	16	0.05
Infraclavicular	0	0	0	0	3	16	19	38	0.1
Axillary	0	0	0	2	8	47	19	76	0.2
Psoas compartment	0	0	0	0	5	50	15	70	0.2
Femoral	0	0	0	1	6	57	124	188	0.6
Ilio-fascial	0	0	2	0	4	57	53	116	0.04
Parasacral	0	0	0	0	2	3	1	6	0.02
Sciatic subgluteal	0	0	0	0	1	13	11	25	0.08
Sciatic lateral	0	0	0	7	44	28	31	110	0.3
Sciatic posterior popliteal	0	0	0	0	37	108	153	298	0.9
Sciatic lateral popliteal	0	0	0	0	8	30	28	66	0.2
Lumbar paravertebral	0	0	0	1	5	8	6	20	0.6
Thoracic paravertebral	0	1	0	3	21	20	16	61	2
Intercostal	0	3	0	1	3	2	1	10	0.03
Others	0	6	0	6	27	15	10	64	0.2

Table 7: Incidence of complications according to the age (n = 41).

Complications	0-30 days premature n = 121	0-30 days full term n = 475	1-6 mo premature n = 822	1-6 mo full term n = 2,442	6 mo – 3 yr n = 10,499	3-12 yr n = 12,974	> 12 yr n = 3,799
% of studied population	0.4	1.5	2.6	7.8	33.7	41.7	12.2
Relative % of complications	2.4	2.4	7.3	17.1	17.1	39	14.6
% of complications in the group	0.8	1	0.02	0.3	0.06	0.13	0.05

Epidemiology and morbidity of regional anaesthesia in children: a follow-up one-year prospective survey of the French-Language Society of Paediatric Anaesthesiologists (ADARPEF)

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No conflict of interest

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Summary

Background: The ADARPEF (French-Language Society of Paediatric Anaesthesiologists) designed a one-year prospective, multicenter and anonymous study in order to update both epidemiology and morbidity of regional anaesthesia in children.

Methods: From November 2005 to October 2006, data from participating hospitals were recorded using an identification form, a data recording form and a complication form. Information collected included the characteristics of the hospitals, the number and type of regional anaesthetics, the age of the involved children as well as the incidence and type of complications.

Results: Data collected in 47 institutions included 104,612 pure general anaesthesias, 29,870 general anaesthesias associated with regional blocks and 1,262 pure regional blocks. Central blocks accounted for 34 % of all RA. Peripheral blocks (66 %) were upper or lower limb blocks (29 % of peripheral blocks), trunk and face blocks (71 %). In children aged ≤ 3 yr, the percentage of central blocks was similar to the peripheral ones (45% versus 55), while in older children, peripheral blocks were more than four times used than peripheral ones. Complications (41 involving 40 patients) were rare and usually minor. They did not result in any sequelae. The study revealed an overall rate of complication of 0.12%; CI 95% [0.09-0.17], significantly 6 times higher for central than for peripheral blocks.

Conclusions: Due to the low rate of complications, regional anaesthetic techniques have a good safety profile and can be used in order to provide postoperative analgesia. In addition, the results should encourage anaesthesiologists to continue to use peripheral instead of central (including caudal) blocks as often as possible when appropriate.

Key words: Pediatrics: children; Regional anesthesia: epidemiology, complications