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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

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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3 **Epidemiology and morbidity of regional anaesthesia in children: a follow-up one-year**
4 **prospective survey of the French-Language Society of Paediatric Anaesthesiologists**
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6 **(ADARPEF)**
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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 (0.9%), 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

1
2
3 pediatric beds, geographical location. As soon as it was completed, the form was sent to
4
5 coordinator who used it to give each hospital an ID number.
6
7

8 9 *Epidemiology*

10
11 The epidemiological study took place in four steps:

12
13 (i) Step 1: in each participating hospital, each anaesthesiologist provided extemporaneous
14
15 details from each patient he anesthetized.
16
17

18
19 (ii) Step 2: the local coordinator recorded overall data on an electronic form with the ID
20
21 number separating pure GA, RA associated with GA and isolated RA. RA was assigned to a
22
23 central blocks group including spinals and epidurals (caudal, sacral, lumbar, thoracic) or in a
24
25 peripheral nerve blocks group. Catheter placements were identified in each group. Patients
26
27 were classed into 7 age groups: ex-preterm aged < 1 mo; full-term aged < 1 mo, ex- preterm
28
29 aged 1-6 mo, full-term aged 1-6 mo, infants and toddlers aged 6 mo-3 yr, children aged 6-12
30
31 yr, adolescents aged 12-18 yr.
32
33

34
35 (iii) Step 3: the coordinator was sent the details forms monthly. He used the ID number to
36
37 check and classify the data before entering the whole in a database hiding the ID numbers. In
38
39 this way, data became anonymous for everybody.
40
41

42
43 (iv) Step 4: overall results were analysed.
44

45 46 *Morbidity*

47
48 Morbidity was studied 1 yr long on the basis of outcome. Any adverse event was reported by
49
50 the practitioner(s) caring for the patient using a form with the ID number of the hospital, the
51
52 patient being unidentified. The coordinator received the form and was the only one able to
53
54 identify the hospital using the ID number. The form described the technique and equipment
55
56 used, the type of drug and the administered dose, the specific of the adverse event, the
57
58 management and the patient outcome, including neurological and medico-legal implications if
59
60 relevant. Parents of children discharged the day of surgery received a call the next day and/or

1
2
3 were requested to phone the anaesthesiologist in case of any disturbing symptom.

4
5 Hospitalized children were followed up daily until discharge. When a symptom persisted on
6
7 discharge, one (or more) specific consultation, per example with a neurologist if there was a
8
9 neurological deficit, was organized to assess the evolution, the coordinator being sent he
10
11 complication form either when full recovery was found or at the end of 1 yr.
12
13

14 15 Analysis

16
17 Results are calculated as percentages of overall RA and given in terms of anaesthetics
18
19 rather than in terms of patients. Upper 95% confidence bound (CI 95%) was used each time
20
21 that necessary. In case of comparison, $P < 0.05$ was considered significant.
22
23
24
25
26
27

28 Results

29 30 31 *Identification*

32
33 The study involved 47 hospitals: 37 university hospitals, 6 non-university public hospitals,
34
35 and 4 private hospitals. The size of the hospitals varied from 100 to 2000 beds including 25 to
36
37 400 paediatrics beds. Thirty-nine facilities were located in France, 3 in Belgium, and 1 each in
38
39 Canada, Italy, Switzerland and Tunisia. Forty-one hospitals included a specific paediatric
40
41 department, whereas 6 hospitals treated children and adults together in the same unit.
42
43
44

45 46 *Epidemiology*

47
48 From November 2005 until October 2006, data from 135,744 paediatric anaesthesia,
49
50 including 104,612 pure GA and 31,132 RA (29,870 associated with GA and 1,262 isolated)
51
52 were collected prospectively. Table 1 presents different RA according to patient's age.
53
54
55

56
57 Central blocks represented 34 % of all RA (table 2), increasing to 45 % in children aged <
58
59 3 yr. Caudal blocks represented 80 % of all central blocks, lumbar epidurals 11%, spinals and
60
thoracic epidurals 3% each, while "others" were mainly epidural catheters surgically inserted,

1
2
3 combined spinal/epidural RA and few staged segmental RA.
4

5
6 Peripheral blocks represented 66 % of RA. Upper limbs blocks accounting for 10% of
7
8 peripheral were mainly axillary (43% of all upper limb blocks), fingers (13%), and
9
10 infraclavicular (11 %) blocks, while “others” were isolated medial or radial, interdigital,
11
12 posterior or anterior interosseous and posterior ulnar blocks (table 3). Lower limbs blocks
13
14 accounting for 19% of peripheral were femoral (20 % of all lower limb blocks), ilio-fascial
15
16 (16%), posterior popliteal sciatic (15%) and lateral sciatic (12%) blocks, while “others” were
17
18 mainly blocks of toes, posterior tibial and saphenous blocks (table 4). Trunk and face blocks
19
20 consisted mainly of ilio-inguinal (37% of all trunk and face blocks), penile (35%) and
21
22 pudendal nerve blocks while face blocks included 1,118 blocks (5%) of nerves supplying
23
24 head and neck, mainly infraorbital nerve block for cleft palate repair, the remaining being
25
26 mainly subtenon, retrobulbar, auricular and laryngeal (table 5).
27
28
29
30
31

32 The study recorded 2726 (9% of all RA) catheter placements (table 6). No data on duration
33
34 of use of catheters or on their possible home use was collected. Placements concerned 23% of
35
36 lower limbs blocks (mainly popliteal sciatic and psoas compartmental), 15% of central blocks
37
38 (a catheter being inserted in 88% of lumbar/thoracic epidurals, 71% of sacrals, 1% of caudals,
39
40 and 0.8% of spinals), 6% of upper limbs blocks (mainly axillary), and 1% of trunk and face
41
42 blocks, (mainly thoracic paravertebral).
43
44
45

46 Local anaesthetics used in this study were ropivacaine 85%, bupivacaine 8%,
47
48 lévobupivacaine 4%, mepivacaine 2% and lidocaine 1%. Mepivacaine and lidocaine were
49
50 used only in peripheral blocks. Spinal anaesthesia was performed mainly with hyperbaric
51
52 bupivacaine.
53
54

55 56 *Morbidity*

57
58
59 One hundred and seventy five complications forms were collected. Most concerned central
60
61 blocks (n=112, 64%). One hundred and thirty four were eliminated as inappropriate, including

1
2
3 positive test-doses, missing in localisation or puncture, blood reflux through needles or
4
5 catheters, subcutaneous injections without lesions, catheters inadvertently removed, folded or
6
7 capped, inefficient blocks accessed by increase in heart rate at surgical incision, urinary
8
9 retention, and one complaint 6 months after a femoral blockade with motor block of three
10
11 days duration not diagnosed despite a 2 days post operative follow-up in ward... At the end,
12
13 41 forms involving 40 patients were validated. They occurred mostly in the operating theater.
14
15 No one resulted in either sequelae or harm 1 yr later. Their incidence was 0.12% (CI 95% =
16
17 0.09-0.17). After upper extremity and facial blocks (unable to be an alternative to central
18
19 blocks) had been subtracted from peripheral RA for a valid comparison, the incidence was
20
21 founded significantly higher for central (0.29%; CI 95% = 0.21-0.43) than for peripheral RA
22
23 (0.29%; CI 95% = 0.03-0.10) Table 7 presents age-group distribution of complications. The
24
25 incidence was significantly higher in the low age group (0.4% in 3,860 infants aged < 6
26
27 months versus 0.1% in 27, 272 children aged > 6 months). No complication was directly
28
29 related to the use of wrong equipment. No medico-legal concern was recorded. The incidence
30
31 of complications directly related to the use of catheters is 0.14% versus 0.13% in techniques
32
33 without catheter.

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41 One patient (11.5 yr) had two complications related with multiple attempts at performing a
42
43 lumbar epidural. Two complications forms were completed: the first form reported an
44
45 unrecognised dural tap while the second form reported a total spinal anaesthesia following the
46
47 local anaesthetic (LA) injection through the lumbar catheter. Total spinal was recognized in
48
49 recovery room because the patient was unable to breathe spontaneously. The patient did not
50
51 experience any other disability. Controlled ventilation continued, the recovery was uneventful
52
53 4 h later.
54
55
56

57
58 Two 2 ex-preterm (1 and 3 months respectively) had an inadvertent extension of a spinal
59
60 anaesthetic, both due to a rising of their lower limbs during operative installation,

1
2
3 immediately recognized and resulting in isolated apnoea requiring controlled ventilation
4
5 < 12 h long without sequelae.
6
7

8 In terms of toxicity, convulsions occurred in 1 not anesthetised patient (9 yr) given an axillary
9
10 single shot of ropivacaine in a normal dose (aspiration test negative, test dose not done).

11
12 Recovery was full under classical pharmacological treatment, i.e. oxygen by face mask and
13
14 4mg/kg thiopental. Plasma level of LA was not performed. The surgery (fracture reduction)
15
16 was done.
17
18

19
20 Fifteen patients (age ranged from 1.5 mo to 17 yr) underwent cardiac toxicity of LA (0.05%;
21
22 CI 95% 0.03-0.08). The involved blocks were 1 axillary, 6 single shot and 1 continuous
23
24 caudals, 1 penile + ilio-inguinal, 4 lumbar and 2 thoracic epidurals. LA was ropivacaine (5
25
26 cases) or bupivacaine (10 cases), given in adequate doses were except 1 drug error, 0.75%
27
28 ropivacaine caudally given instead of 0.2% details (aged 21 mo). Injections consisted of 9
29
30 single shots through a needle, 4 primary and 2 secondary injections through a catheter. A test
31
32 dose with epinephrine was performed and considered uneventful in 6 patients. Specifics were
33
34 either single changes in electrocardiogram (2 patients) or transient arrhythmias (13 patients
35
36 including 1 bradycardia in a 8 yr old boy given both penile and ilio-inguinal blocks in
37
38 combination). No one required active treatment. Plasma levels of LA were not performed.
39
40
41
42
43

44 In terms of trauma, 2 patients (6 mo and 3 yr respectively) scheduled for one day surgery
45
46 underwent an ilio-inguinal block resulting in colonic puncture. They recovered without
47
48 sequelae after watching, fasting, fluids, and antibiotics in ward.
49
50

51 Ten dural taps (0.10%; CI 95% = 0.05-0.19) were recorded (age ranged from 1 mo to 13
52
53 yr, the one previously reported in association with an inadvertent total spinal being excluded).
54
55 Six of them occurred during caudal blocks in babies, 3 during lumbar and 1 during thoracic
56
57 epidurals. No post-dural puncture headache was noted and preventive analgesia was given in
58
59 4 patients only.
60

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2
3 Five nerve injuries were suspected. The 1st one was an isolated Claude Bernard Horner
4 syndrome catheter remaining 18 h after a thoracic epidural was stopped (aged 12 yr). The 2nd
5 one was a deficit of the external popliteal nerve persisting 48 h after a lumbar epidural was
6 stopped (aged 13 yr). The 3rd one consisted of tingling associated with hypoesthesia in the
7 femoral area following an ilio-fascial block and disappearing for 48 h (aged 11 yr). The 4th
8 one (aged 8 yr) consisted of unilateral tingling in one thigh during 3 weeks following a caudal
9 that was noted as uneventful. The last one was a minor intermittent dorsal pain following a
10 lumbar epidural and requiring intermittent paracetamol 11 mos long (aged 12 yr). All of them
11 recovered fully without serious harm.
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24 Four patients had a minor complication: one inflammation of a lumbar epidural puncture
25 point locally treated (aged 2 yr), one ilio-inguinal block performed at the wrong side (aged 5.5
26 yr), one breakage of femoral catheter requiring removal under LA (aged 12 yr), one pleural
27 displacement of a thoracic paravertebral catheter (aged 12 yr). The displacement was
28 diagnosed because RA had become inefficient. No other signs were noted. The catheter was
29 removed without other treatment.
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42 Discussion

43
44 Regional anaesthesia represents 22% of all anaesthesias recorded by the study, similar to
45 the incidence founded by the previous ADARPEF' study after removal of 5,306 local
46 anaesthesias (Bier blocks, tracheal blocks, infiltrations, field blocks) that are not recorded by
47 the current survey. That is also close to the incidence of 20 – 25% of RA founded in the
48 whole population (adults/children together). Overall complications have the same low rate
49 that found in the study 12 yrs ago (local anaesthesias recorded in the 1st ADARPEF' study
50 being removed). In the same way, adverse effects are mainly related with central blocks; most
51 of the blocks being performed under GA, the practitioners were deprived of clinical signs of
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3 LA toxicity or of nerve injury.
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6 One essential question concerns the accuracy of the data, particularly the reported
7 complications. Some of them could be not recorded, whereas the occurrence of fatalities
8 cannot be hidden. However, the coordinator was intensively connected to each local
9 responsible, phoning or e-mailing him whenever he had doubts. Several anaesthesiologists
10 collected the data at the same time in the same hospital, inevitably adding a mutual review to
11 the double control performed both by the local responsible and the coordinator. Despite an
12 insignificant percentage of minor complications could have been missed after discharge, the
13 procedure allows to regard overall data collection as efficient and to consider the risk of
14 missing severe complications as almost non-existent.
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26 27 *Epidemiology* 28 29

30 The widespread geographical distribution of the hospitals involved in the study is
31 representative of the French paediatric anaesthesia in private and public hospitals. The
32 significant amount of data illustrates clearly a transition in practice from predominantly
33 central block to an increased number of peripheral nerve blocks including catheter techniques.
34 Since the previous ADARPEF study, the overall incidence of central blocks has decreased
35 dramatically, collapsing even in children aged < 3 years (however the group of age
36 undergoing central blocks most frequently), while the incidence of peripheral blocks
37 increased strongly. Trunk blocks represent their largest part, characterized by the emergence
38 of techniques that were not clearly identified by the previous ADARPEF study (ilio-inguinal,
39 para-umbilical, pudendal, thoracic and lumbar paravertebral blocks). Facial blocks are a new
40 and widely used practice for facial and reconstructive surgery, particularly in cleft lip repair
41 [2].
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58 The study records a significant number of catheter placements, in central as well in
59 peripheral RA, most of them being neuraxial. Indeed, neuraxial continuous epidural analgesia
60

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2
3 is one of the best techniques to obtain pain relief in children (particularly postoperative pain
4 relief in younger). Perineural catheters became usual practice, first in hip and foot surgery.
5
6
7
8 Continuous peripheral nerve blockade emerged as safe and effective in adults. Then several
9
10 prospective studies demonstrated their benefits after orthopaedic procedures in children. In
11
12 2001, placement of a brachial plexus catheter for pain control was far less common in
13
14 children than in adults [3]. Today, peripheral blocks allow to provide postoperative pain relief
15
16 in the greatest part of orthopaedic surgery using RA techniques [4-6], and to treat complex
17
18 regional pain syndrome in adolescents [7].
19
20
21

22 These results confirm a retrospective report from a single institution (10,929 RA
23
24 performed on a 17 yr period) revealing both a dramatic decrease of central blocks, and the
25
26 emergence of continuous postoperative analgesia via perineural catheters [8], peripheral
27
28 blocks emerging as routine practice in children at the end of the 90's following both peer
29
30 recommendations [1] and evolution of devices.
31
32
33

34 *Morbidity*

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36
37 Previous case reports of spinal cord injury resulting from thoracic epidural [9], sacral
38
39 osteomyelitis [10] and bowel traumas requiring surgery resulting from ilio-inguinal blocks
40
41 [11; 12] revealed that RA in children is not without risk, even in case of peripheral blocks.
42
43
44 The study founds that complications are rare, most often requiring extra observation or minor
45
46 treatment. Most of them occur early in the operating theater. No complications were as a
47
48 result of equipment failure. Only one child includes pathologies lasting months, requiring a
49
50 treatment and/or having a major impact both on child's physical and emotional status and on
51
52 the quality of life of family. Neurologic deficits have good outcome in children as previously
53
54 reported [13; 14]. As reported by literature, complications are more frequent (4 times in the
55
56 current study) in children aged < 6 months that in children aged > 6 months, despite the fact
57
58 that the youngest patients are probably managed by the most experienced paediatric
59
60

1
2
3 anaesthesiologists with maximal precautions. Moreover, this study has confirmed the low
4
5 complications rate despite the performance of 96% on general anaesthesia or heavy sedation;
6
7 indeed, due to the significant differences between children and adults with respect to self-
8
9 control and the ability to communicate effectively, the usual recommendation is that general
10
11 anaesthesia or heavy sedation should not be considered an absolute contraindication to
12
13 regional anaesthesia in children (15).
14

15
16
17 Central RA has the highest incidence of complications (7 times higher than peripheral).
18
19 The incidence remains low despite an increase since the 12 last years. Complications never
20
21 reach the severity found by a UK audit [16] on paediatric epidurals (10,633 epidurals
22
23 performed for 5 yr) reporting permanent residual neurologic deficit in a child aged 3-mo (1-yr
24
25 follow-up), 2 epidural abscesses, 1 meningism, 1 post-dural puncture headache requiring
26
27 active blood patching, 1 drug error resulting in cauda equina syndrome and 5 severe
28
29 neuropathy/radiculopathy resolved over a period of 4-10 mo using a pharmacological therapy
30
31 in a Pain Clinic. It is difficult to explain this difference of severity in complications, excepted
32
33 by the longer duration and the many more cases of the UK survey, i.e. 1,500 versus 10,000.
34
35 The study records a very low overall morbidity of peripheral RA, almost 6 times lower than in
36
37 central RA. Despite 2 colonic punctures, that should encourage anaesthesiologists to use
38
39 peripheral rather than neuraxial (including caudal) blocks as often as possible when
40
41 appropriate.
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48
49 The use of catheters does not seem to increase the occurrence of complications, even if
50
51 considering that the cardiac toxicity following a secondary injection through a catheter could
52
53 be due to an inadvertent displacement of the catheter.
54

55
56 LA toxicity, resulting in 1 case of convulsions only while the UK survey reported 2
57
58 respiratory arrests and 1 seizure, did not require lipid treatment as reported in a child [17].
59

60
Some complications (at least drug error, wrong side, lower limbs raising resulting in

1
2
3 extended spinal anaesthetics, drug error and a part of cardiac toxicity) were avoidable. It is
4
5 thus possible to improve the safety of paediatric RA provided basic precautions are followed.
6
7
8
9

10 11 **Conclusion**

12
13
14 This survey involving a large population shows that the importance of RA in pediatrics is
15
16 unchanged for 12 yr, but that a clear transition in practice from central to peripheral blocks
17
18 and continuous techniques has occurred. Some new techniques have emerged. The incidence
19
20 of complications is almost unchanged and remains low, low age and central blocks increasing
21
22 the risk. Most of the recorded complications were minor, occurred at the beginning of the
23
24 procedure in the operating theatre, had a short duration and did not result in permanent harm.
25
26

27
28 This safety profile means that RA remains an excellent way to provide postoperative
29
30 analgesia, despite a risk of complications increasing in children aged < 3 yr.
31
32

33
34 Anaesthesiologists must be encouraged to continue to choose peripheral instead of central
35
36 blocks each time it is possible because a lower morbidity. A future ADARPEF' study should
37
38 be designed for few years to assess the impact of ultrasonography on paediatric RA.
39
40
41
42

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

Technique	0-30 days	0-30 days	1-6 mo	1-6 mo	6 mo – 3 yr	3-12 yr	> 12 yr	Total	%
	premature n = 121	full term n = 475	premature n = 822	full term n = 2,442	n = 10,499	n = 12,974	n = 3,799		
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	0-30 days	1-6 mo	1-6 mo	6 mo – 3 yr	3-12 yr	> 12 yr	Total	Blocks	%
	premature n = 121	full term n = 475	premature n = 822	full term n = 2,442	n = 10,499	n = 12,974	n = 3,799			
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	0-30 days	1-6 mo	1-6 mo	6 mo – 3 yr	3-12 yr	> 12 yr	Total	Blocks	%
	premature n = 121	full term n = 475	premature n = 822	full term n = 2,442	n = 10,499	n = 12,974	n = 3,799			
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

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3 **Epidemiology and morbidity of regional anaesthesia in children: a follow-up one-year**
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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