

Building a selective dorsal rhizotomy service in Shanghai: a retrospective evaluation of one team across two public tertiary children's hospitals, 2015 – 2026

Bo Xiao

Shanghai Children's Medical Center

Jiaqi Feng

Shanghai Children's Medical Center

Yiying Li

qijia zhan

Shanghai Children's Hospital

Wenbin jiang

Shanghai Children's Hospital

Rong Mei

Shanghai Children's Medical Center

Yunhai Song

Shanghai Children's Medical Center

Min Shen

minshen223@vip.163.com

Shanghai Children's Medical Center

Method Article

Keywords: Selective dorsal rhizotomy, Cerebral palsy, Health services, Quality improvement

Posted Date: October 23rd, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-11266627/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Purpose

Selective dorsal rhizotomy (SDR) reduces spasticity, but it is performed at relatively few centers, and little is known about how such services operate. We evaluated an SDR service delivered by one team at two public tertiary children's hospitals in Shanghai.

Methods

We retrospectively reviewed all single-level SDRs guided by compound muscle action potentials evoked by crescendo single-pulse stimulation from June 2015 to August 2026. We examined where patients came from, what happened after consultation, length of the surgical admission, adverse events and their review, and completion of post-operative assessment. Proportions were compared using Fisher's exact test.

Results

In total, 1312 patients underwent SDR: 772 at the first hospital and 540 after the team moved. Thirty-seven (2.8%) lived in Shanghai, and 594 (45.3%) lived 1000 km or more away. Of 7352 children seen in consultation, 1312 (17.8%) proceeded to surgery; for 5439 of the 6040 who did not proceed, no reason was documented. Transient proximal right lower-limb weakness occurred in 11 patients (0.84%), all operated between 2018 and 2020 before the dural opening was moved cranially (11/524 versus 0/788; $p = 3.9 \times 10^{-5}$). No surgical site infection was recorded. Median surgical admission fell from 11 to 7 days. The early post-operative assessment was completed by 89.7% of patients, and post-operative gait analysis by 515 of 670 eligible patients (76.9%).

Conclusion

One team sustained a high-volume SDR service with a national catchment after moving hospitals. Individual adverse-event records helped identify and correct a probable technical cause of transient proximal weakness. The main information gap concerned children assessed but not operated on; most had no documented reason.

Introduction

Selective dorsal rhizotomy (SDR) reduces spasticity in selected children with cerebral palsy, and evidence for its effects on tone, gait, and function has accumulated over four decades [2, 5, 6]. Availability has not kept pace. A recent survey of ten centers on five continents found wide variation in

practice [8], while the burden of cerebral palsy is greatest in low- and middle-income countries, where funding and workforce shortages limit access to advanced procedures such as SDR [4, 7].

Most reports describe outcomes, refinements of rootlet selection, or comparisons with other treatments. The composition of an SDR team has been described [3], but service-level performance is rarely reported. For a center considering whether it can establish a similar service, practical questions matter: where do patients come from, how many assessed children proceed to surgery and why the rest do not, how completely they return for assessment, and how recurring adverse events are detected and corrected.

Our team began single-pulse-guided SDR at Shanghai Children's Hospital in June 2015 and moved to Shanghai Children's Medical Center in April 2023. Referrals came from across China throughout. Here we report the service rather than surgical outcomes, which have been discussed in earlier cohorts [10, 11]. We describe access, the pathway from consultation to surgery, efficiency, safety with a documented corrective change, and continuity of assessment across three eras defined by two service events.

Methods

Design and setting

We reviewed all patients who underwent SDR under this team's care between June 2015 and August 2026. The service operated in the Department of Neurosurgery at Shanghai Children's Hospital (SCH) until March 2023, then moved to Shanghai Children's Medical Center (SCMC), National Children's Medical Center, from April 2023, where a dedicated SDR center was established. SDR continued at SCH at fewer numbers a year by other clinicians and is not included. Operations performed by the team at two SCMC branch hospitals outside Shanghai are counted with SCMC: Fujian Children's Hospital in Fuzhou (n = 50) and Linyi Maternity and Child Healthcare Hospital in Shandong (n = 18). We also excluded about ten operations before June 2015, when rootlets were selected using train stimulation, and about 150 operations performed by the surgeon as a visiting surgeon at other hospitals up to August 2026. The same operating surgeon, intraoperative neurophysiology technologist, and core rehabilitation liaison served throughout.

Referral and assessment pathway

Families reached the service through outpatient clinics or online consultation. There was no catchment restriction, and records from both routes were held in a single file per child, so each child was counted once. We did not actively contact families who did not return after consultation because we did not want the service to appear to press them toward surgery.

Among those assessed, cranial and whole-spine magnetic resonance imaging was obtained in 1579 children; whole-exome sequencing when history or examination was atypical (n = 107); and

anteroposterior hip radiographs in children aged three years or older ($n = 6513$, mostly at referring institutions). Orthopedic review for deformity or fixed contracture was performed in 254 children. For candidates able to walk without assistance and cooperate with testing, instrumented three-dimensional gait analysis within six months before surgery was requested ($n = 751$). These studies were done at the Motion and Gait Analysis Center of Yueyang Hospital of Integrated Traditional Chinese and Western Medicine, Shanghai University of Traditional Chinese Medicine. The collaboration began ad hoc and, from December 2016, included a formal tripartite conference involving neurosurgery, rehabilitation medicine, and gait analysis.

The minimum age for SDR was three years. Children at Gross Motor Function Classification System (GMFCS) level V were assessed individually. Previous hip surgery was not a contraindication: 102 children had already undergone hip surgery elsewhere when first seen, and some proceeded to SDR. For children with hip subluxation at first consultation, the service currently advises SDR first, followed by orthopedic review after at least six months of rehabilitation. The diagnosis and topographical pattern recorded for each patient came from the pre-operative rehabilitation assessment, which also mapped the spastic muscle groups that defined the operative target.

Operative technique

All procedures used a single-level L2 laminectomy. Rootlets were selected using compound muscle action potentials evoked by crescendo single-pulse stimulation, interpreted in real time by a dedicated technologist [10–12]. Stimulus increments and the end-point criterion were standardized by mid-2016. Fifty-hertz train stimulation was also used to decide whether a selected rootlet should be sectioned by 50% or 75% [11]; this use was phased out gradually after 2019. Earlier reports included 821 [10] and 318 [11] of the present patients.

Recording used 15 channels: seven muscles in each lower limb and one anal sphincter channel. From late 2024, the sphincter was recorded on two channels, one per side, so that a displaced electrode would not leave it unmonitored. As experience accumulated the L2 laminectomy was progressively reduced, from the lower two-thirds of the lamina to its lower third plus the L2–L3 interlaminar space. In this lower exposure the right L2 root had to be retracted caudally to be stimulated. From October 2020 the laminectomy was sited a few millimetres more cranially, bringing the root exit better into view.

Rehabilitation and follow-up

Structured rehabilitation for at least two years was recommended to every family. Initially families were asked to complete it in Shanghai at the Shanghai Rehabilitation and Vocational Training Center for the Disabled. Because long stays proved impractical for most non-local families, this requirement lapsed from 2018, and rehabilitation has since been delivered mainly in the home province. An assessment two

to three weeks after surgery, in person or online for some families, was scheduled for all patients. Post-operative gait analysis was recommended at 12, 24, and 36 months.

Definitions and analysis

Three eras were defined by operation sequence. Era 1 comprised all operations before the first operation with the modified dural opening, which took place in October 2020; its exact date was not recorded. Era 2 began with that operation and ended with the last operation at SCH in March 2023. Era 3 comprised operations at SCMC from April 2023. Surgical admission is the index hospital stay for the operation.

Transient lower-limb weakness was defined as new post-operative weakness that resolved without intervention. We distinguished two patterns: proximal weakness, involving non-target proximal muscles, and distal weakness, occurring in a target muscle after marked reduction of its tone. Weakness unresolved at 12 months would have been classed as persistent.

Adverse events were identified from inpatient records, the early assessment, and later follow-up messages and reports from families. There was no systematic long-term surveillance. For this report, wound entries were re-reviewed in electronic inpatient records and classified against the National Healthcare Safety Network (NHSN) definition of superficial incisional surgical site infection [1]. Post-operative lower-limb pain was recorded when it led to a change in management; milder complaints were not recorded.

Distance was the straight-line great-circle distance from Shanghai to the capital of the province of residence. We grouped distances into mutually exclusive bands: Shanghai, < 500 km, 500–999 km, 1000–1499 km, ≥ 1500 km, and outside China.

Gait data cover operations through 31 August 2026. By then no patient operated in 2026 had had a post-operative study, so the denominator for post-operative completion is patients with a pre-operative study who were operated on before 2026.

Medians are given with range and, where available, interquartile range (IQR); exact binomial 95% confidence intervals (CI) are given where stated. Proportions were compared using two-sided Fisher's exact test. After seeing the yearly distribution of weakness, we added three post hoc analyses: 2015–2017 versus January 2018 to the modification, a Cochran–Armitage trend test over 2018–2020, and operations in 2019–2020 before the modification versus those after it.

Results

Cohort

Between June 2015 and August 2026, 1312 patients underwent SDR: 772 at SCH and 540 at SCMC. Annual volume rose from 43 in the seven months of 2015 to 165 in 2025, with 128 operations in the first

eight months of 2026 (Fig. 1). Nine hundred seventy-three patients were male (74.2%; Table 1). Median age at surgery was 5.7 years (range 3–47), and 11 patients (0.8%) were 18 years or older. GMFCS levels I–III accounted for 1024 patients (78.0%), and diplegia was the most frequent topographical pattern (799, 60.9%). Median pre-operative GMFM-66 score was 59.98 (range 22.37–97.31; n = 1312).

Table 1
Characteristics of the cohort (n = 1312)

Characteristic	n	%
Treating hospital		
Shanghai Children's Hospital (Jun 2015 – Mar 2023)	772	58.8
Shanghai Children's Medical Center (Apr 2023 – Aug 2026)	540	41.2
Sex		
Male	973	74.2
Female	339	25.8
Age at surgery, years		
Median (range)	5.7 (3–47)	
18 years or older	11	0.8
GMFCS level		
I	179	13.6
II	351	26.8
III	494	37.7
IV	256	19.5
V	32	2.4
Topographical pattern		
Diplegia	799	60.9
Quadriplegia	361	27.5
Hemiplegia	131	10.0
Monoplegia	21	1.6
Pre-operative GMFM-66 (n = 1312)		
Median (range)	59.98 (22.37–97.31)	
GMFCS, Gross Motor Function Classification System; GMFM-66, Gross Motor Function Measure (66 items). Shanghai Children's Medical Center includes operations performed by the team at its branch hospitals outside Shanghai (n = 68: Fuzhou 50, Linyi 18). Diagnosis and topographical pattern are those of the pre-operative rehabilitation assessment. Residence is the province of residence; distance is the great-circle distance from Shanghai to that province's capital. Pre-operative gait analysis was requested for children able to walk without assistance and to cooperate with testing (73.3% of those at GMFCS I–III). Percentages may not sum to 100 because of rounding.		

Characteristic	n	%
Treating hospital		
Pre-operative gait analysis	751	57.2
Residence (distance from Shanghai)		
Shanghai	37	2.8
< 500 km	122	9.3
500–999 km	538	41.0
1000–1499 km	266	20.3
≥ 1500 km	328	25.0
Outside China	21	1.6
GMFCS, Gross Motor Function Classification System; GMFM-66, Gross Motor Function Measure (66 items). Shanghai Children's Medical Center includes operations performed by the team at its branch hospitals outside Shanghai (n = 68: Fuzhou 50, Linyi 18). Diagnosis and topographical pattern are those of the pre-operative rehabilitation assessment. Residence is the province of residence; distance is the great-circle distance from Shanghai to that province's capital. Pre-operative gait analysis was requested for children able to walk without assistance and to cooperate with testing (73.3% of those at GMFCS I–III). Percentages may not sum to 100 because of rounding.		

Access

Patients came from 31 provinces, autonomous regions, and municipalities of mainland China, and 21 patients (1.6%) lived outside China (Fig. 2). Thirty-seven patients (2.8%) lived in Shanghai, fewer than in either neighboring province (Zhejiang 54; Jiangsu 52). By distance band, 122 patients (9.3%) lived less than 500 km from Shanghai, 538 (41.0%) 500–999 km, 266 (20.3%) 1000–1499 km, and 328 (25.0%) 1500 km or more (Table 1).

Pathway from consultation to surgery

Over the same period, 7352 children were seen in consultation, in person or online, of whom 1312 (17.8%) proceeded to surgery (Fig. 3). A reason for not proceeding was documented for 601 of the 6040 who did not proceed: families declined or hesitated in 239; age criteria were not met in 177, including 165 because the child was younger than three years; assessment identified a condition other than cerebral palsy in 157, most often hereditary spastic paraplegia (n = 121); and 28 children at GMFCS level V did not proceed after individual assessment. For the remaining 5439 patients (90.0%), no reason was documented. Approximately 400 of these were first seen in 2026 and may still be deciding.

Efficiency

Median surgical admission was 11 days (IQR 10–11) in Era 1, 10 days (9–10) in Era 2, and 7 days (7–7) in Era 3 (Table 2). The interval from first consultation to surgery was not recorded systematically; the team currently estimates it at 8–12 weeks.

Table 2
Service indicators by era

Period	Era 1	Era 2	Era 3	Overall
	Jun 2015 – Oct 2020	Oct 2020 – Mar 2023	Apr 2023 – Aug 2026	Jun 2015 – Aug 2026
Hospital	SCH	SCH	SCMC	—
Operations, n	524	248	540	1312
Surgical admission, days, median (IQR; range)	11 (10–11; 9–13)	10 (9–10; 8–12)	7 (7–7; 6–8)	—
Early assessment (2–3 weeks) completed, n (%)	467 (89.1)	217 (87.5)	493 (91.3)	1177 (89.7)
Transient proximal right weakness, n (%)	11 (2.10)	0	0	11 (0.84)
Transient distal weakness (gastrocnemius), n	2	0	0	2
Persistent weakness, n	0	0	0	0
Delayed wound healing, n (%)	17 (2.2)		6 (1.1)	23 (1.8)
Surgical site infection (NHSN definition), n	0	0	0	0
Other adverse events documented, n	0	0	0	0

SCH, Shanghai Children's Hospital; SCMC, Shanghai Children's Medical Center; IQR, interquartile range; NHSN, National Healthcare Safety Network. The boundary between Eras 1 and 2 is the first operation with the modified dural opening, in October 2020; its exact date was not recorded. Includes 68 operations at SCMC branch hospitals outside Shanghai (Fuzhou 50, Linyi 18). Right hip adductors and rectus femoris; all operated January 2018 – September 2020; first noticed around the third post-operative day; complete recovery in two weeks to three months (median eight weeks). Era 1: 95% CI 1.05–3.73%; versus 0/788 in Eras 2 and 3 combined (upper 95% confidence limit 0.47%), two-sided Fisher exact test $p = 3.9 \times 10^{-5}$. Post hoc: 0/193 in 2015–2017 versus 11/331 from January 2018 to the modification, $p = 0.009$; 6/213 in the 2019–2020 operations before the modification versus 0/788, $p < 0.001$; trend over 2018–2020 (5/118, 4/132, 2/81), $p = 0.48$. Target muscle after marked reduction of its tone; operated in 2016 and 2017; complete recovery by six and 12 months. Weakness unresolved at 12 months. Eras 1 and 2 combined (both at SCH; split by era); Era 3 includes three at branch hospitals. Noted on post-operative day 6–7 and resolved with dressing changes over three to seven days; no purulent discharge, wound culture, deliberate opening of the wound or antibiotic treatment was recorded, and none met the NHSN definition of superficial incisional surgical site infection [1]. Cerebrospinal fluid leak, deep infection or meningitis, wound breakdown, urinary retention requiring catheterisation, readmission within 30 days, new incontinence, sensory disturbance beyond three months, reoperation, death – none documented in the available records (inpatient records, early assessment, and subsequent messages and reports from families). Post-operative lower-limb pain that led to a change in management was recorded in 102 patients (7.8%); milder hypersensitivity was not recorded (see text).

Transfer between institutions

In the two complete years at SCMC, 142 operations were performed in 2024 and 165 in 2025. Twenty-one of the 2024 operations and 25 of the 2025 operations were done at branch hospitals. This compared with a maximum of 132 operations at SCH in 2019. Admission became shorter, and early-assessment completion did not fall (Table 2).

Safety and quality improvement

We recorded two patterns of transient weakness (Table 2). Weakness of the right hip adductors and rectus femoris occurred in 11 patients (0.84%; 2.10% of operations before the dural-opening change), all operated between January 2018 and September 2020. It was first noticed around post-operative day 3, once wound pain no longer limited movement, and recovered completely within two weeks to three months (median eight weeks). Weakness of the gastrocnemius, a target muscle, after marked reduction of its tone occurred in two patients operated in 2016 and 2017; both recovered completely by six and 12 months. None met the definition of persistent weakness.

The uniformity of side and level among the proximal episodes prompted us to review the cases. With the dural opening over the lower thirds of the L2 lamina, exposing the right L2 root required retracting it with a nerve hook toward the center of the opening at the beginning of testing. We considered this maneuver the likely cause. No episode had occurred in 2015–2017 (0/193 operations), whereas 11 episodes occurred from January 2018 to the change (11/331; $p = 0.009$). By 2018, the dura opening had been lowered, reducing exposure of the right L2 root.

When we moved the opening cranially in October 2020, no other change was made to equipment, personnel, or anesthetic protocol. No further proximal episode was documented: 11/524 operations before the change (2.10%; 95% CI 1.05–3.73%) versus none of 788 afterwards (upper 95% confidence limit 0.47%; $p = 3.9 \times 10^{-5}$). Episodes did not become less frequent before the change (five in 2018, four in 2019, and two in 2020; $p = 0.48$ for trend). Against the 213 operations of 2019–2020 that preceded it, with six episodes, the difference persisted ($p < 0.001$).

Delayed wound healing was recorded in 23 patients (1.8%): 17 at SCH and six at SCMC, three of them at branch hospitals. It was noted on post-operative day 6 or 7 and resolved with dressing changes over three to seven days. No record documented purulent discharge, a wound culture, deliberate opening of the wound, or antibiotic treatment, and none met the NHSN definition of surgical site infection.

None of the following was documented for any patient: cerebrospinal fluid leak, deep infection or meningitis, wound breakdown, urinary retention requiring catheterization, readmission within 30 days, new incontinence, sensory disturbance beyond three months, reoperation, or death. Post-operative lower-limb pain that led to a change in management was recorded in 102 patients (7.8%) and usually resolved within days to two weeks. Milder transient hypersensitivity was not recorded.

Continuity

The early assessment was completed by 1177 patients (89.7%): 89.1%, 87.5%, and 91.3% across the three eras.

Pre-operative gait analysis was obtained in 751 patients (57.2% of the cohort; 73.3% of those at GMFCS I–III). Of the 670 of these who were operated on before 2026, 515 (76.9%) had a post-operative study, at intervals of six to 48 months. The recommended 12-, 24-, and 36-month schedule was not consistently achieved.

By year of surgery, completion was 41.7% for 2015, 59.5% for 2016, and 63.4% for 2017; it ranged from 71.4% to 86.5% for each year from 2018 to 2025.

By distance band, the ratio of post-operative to pre-operative studies was 27/27 among Shanghai residents, 72.6% below 500 km, 69.9% at 500–999 km, 70.2% at 1000–1499 km, and 59.1% at 1500 km or more. Province-level counts could not be restricted to patients operated before 2026, so these band denominators include the 81 patients operated in 2026 and therefore understate completion.

Training

Between 2023 and 2026, the team hosted 16 international fellows from 13 centers. One of those centers now performs SDR independently.

Discussion

The service functioned as a national one rather than a municipal one. Fewer than 3% of patients lived in Shanghai, and nearly half lived 1000 km or more away. Two factors may have contributed: an open referral route, including online consultation, available to families anywhere in China; and cross-province health-insurance settlement, which over the study period moved from full prepayment with reimbursement at home to direct settlement at discharge. A centralized service for a low-volume operation needs a financing route for non-local patients, whatever form it takes.

Fewer than one in five children seen in consultation underwent surgery, and for 90% of those who did not proceed no reason was documented. Because families who did not return were not contacted, the course of most of these children is unknown. They may have been judged unsuitable informally, chosen other treatment, found travel or cost prohibitive, or still be deciding; the records cannot distinguish these possibilities. A service that reports only its operated cohort does not see this group at all. A simple field recording the reason for each decision would have answered this question prospectively.

Early assessment was completed by about nine in ten patients in every era, whereas post-operative gait analysis was obtained in three-quarters of eligible patients but at variable intervals. The pre-operative study was requested while families were seeking surgery; the post-operative study came afterwards, when travel burden may weigh more heavily. Completion was highest among Shanghai residents, similar from less than 500 to 1499 km, and lowest beyond 1500 km, which is consistent with this explanation. These observations do not show that distance determined whether a family returned.

The proximal episodes were uniform in side and level. Per-case records made this pattern visible; an aggregate weakness rate mixing them with distal weakness of another mechanism would have obscured it. The pattern pointed to the geometry of the dural opening rather than rootlet selection. Their onset was abrupt, with none in the first two and a half years, and they did not become less frequent before the change, which does not fit a learning curve. This remains a before-and-after comparison within one team, so we regard the modification as a probable cause of the reduction rather than proof.

The seven-day admission seen in recent years reflects a model in which rehabilitation follows discharge in the home province. In a worldwide survey, inpatient rehabilitation after SDR ranged from none to six weeks [8].

Beyond describing the composition of an SDR team [3], this report adds service-level indicators that such a team can collect from its own records. Table 3 sets out the components of this service by WHO health-system building block [9], as a description for centers planning a similar service rather than a validated standard.

Table 3

Proposed service components informed by the Shanghai experience, arranged by the WHO health-system building blocks [9]

Building block	Component	Configuration in this service	Observation in this series
Health workforce	Surgical and neurophysiology team	One team throughout: one operating surgeon, a dedicated intraoperative neurophysiology technologist, a rehabilitation liaison	Team unchanged across the change of institution; annual volume 142 and 165 in the two complete years after the move
	Real-time interpretation of evoked EMG	Crescendo single-pulse CMAP read during surgery by the technologist [10–12]; stimulation standardised by mid-2016	Not evaluated as a separate component
Medical products and technologies	Intraoperative monitoring	15 recording channels (seven muscles per limb, one anal sphincter channel); 16 from late 2024 (sphincter recorded on each side); stimulus current in 0.01 mA steps; continuous data capture	Specification used here; alternatives not compared
	Instrumented gait analysis	External partner laboratory; not held in house	Pre-operative study in 751 (57.2%); post-operative study in 515 of 670 eligible (76.9%)
Service delivery	Pre-operative multidisciplinary review	Tripartite conference (neurosurgery, rehabilitation medicine, gait analysis) since December 2016; target-muscle mapping by rehabilitation medicine	751 had pre-operative gait analysis; the formal conference began in December 2016
	Surgical admission and early review	Index admission for the operation; assessment at 2–3 weeks	Median admission 11 → 10 → 7 days across eras; early assessment completed by 89.7%
	Operating capacity	Operations also performed by the team at two SCMC branch hospitals outside Shanghai	Chosen by families to shorten the wait for surgery; n = 68 of the 540 SCMC operations
	Post-operative rehabilitation	At least two years recommended; required in Shanghai until 2018, since then mainly in the home province	Long stays in Shanghai proved impractical for non-local families; content and adherence not evaluated

CMAP, compound muscle action potential; EMG, electromyography; NHSN, National Healthcare Safety Network; SCMC, Shanghai Children's Medical Center. The table describes how this service was configured and what was observed in this series. It is not a validated minimum standard: specifications are those used by this team, and no configuration was compared with an alternative.

Building block	Component	Configuration in this service	Observation in this series
Health information	Per-case adverse-event record	Side, level, timing and recovery recorded for each event	Separated 11 proximal right-sided episodes, with a common technical cause, from two distal episodes; wound events classified against the NHSN definition
	Reason for not proceeding	Recorded when stated; families not recalled	Reason documented for 601 of 6040 (10.0%)
Leadership and governance	Adverse-event review	Signal → presumed cause → technical change → continued recording	11/524 before versus 0/788 after the change; none before 2018 and no decline 2018–2020
Financing	Route for non-local patients	Cross-province health-insurance settlement, now direct at discharge	97.2% of patients lived outside Shanghai; effect of financing not measured
CMAP, compound muscle action potential; EMG, electromyography; NHSN, National Healthcare Safety Network; SCMC, Shanghai Children's Medical Center. The table describes how this service was configured and what was observed in this series. It is not a validated minimum standard: specifications are those used by this team, and no configuration was compared with an alternative.			

Limitations

This is a retrospective description of one team's service without a comparison group, and surgical outcomes are not reported. Reasons for not proceeding were documented for only 10.0% of those who did not proceed. Distance was measured to the capital of the province of residence, a crude proxy for travel burden; travel time and costs were not recorded. After the early assessment, adverse events relied on reports from families rather than systematic surveillance, so events managed elsewhere may have been missed. Wound entries in electronic records were largely templated, so their classification rests on what the entries did and did not state. Gait analysis was limited to children who could walk without assistance and cooperate with testing. The safety comparison is before-and-after and cannot separate the effect of the dural-opening modification from other changes over time.

Conclusion

Over eleven years, one team built and sustained a high-volume SDR service with a national catchment across a change of institution. Individual adverse-event records allowed a probable technical cause of transient proximal weakness to be recognized and addressed. The main gap in the service's own information concerns children who did not proceed to surgery; for most of them, no reason was recorded.

Declarations

Author Contribution

Bo Xiao, Jiaqi Feng, and Yiyang Li, Qijia Zhan, Wenbin Jiang, wrote the main manuscript text and Rong Mei, Yunhai Song, Min Shen prepared figures 1-3. All authors reviewed the manuscript."

Acknowledgement

No research funding

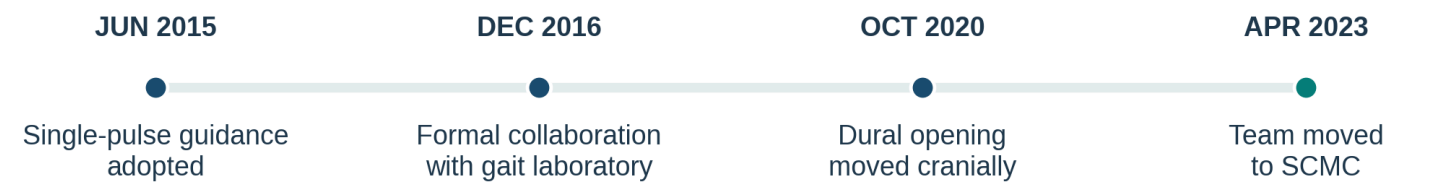
References

1. Centers for Disease Control and Prevention (2026) Surgical site infection event (SSI). In: National Healthcare Safety Network Patient Safety Component Manual, Chap. 9. Centers for Disease Control and Prevention, Atlanta. <https://www.cdc.gov/nhsn/pdfs/pscmanual/9pscscssicurrent.pdf>. Accessed 23 September 2026
2. Chugh D, Main E, Waite G et al (2026) Outcomes of selective dorsal rhizotomy in ambulatory children and young people with cerebral palsy: a scoping review. *Dev Med Child Neurol* 68:175–186. <https://doi.org/10.1111/dmcn.16496>
3. Hall BJ, Gillespie CS, Sneade C, Alder Hey Children's Hospital Physiotherapy Group, Quirk D, Hennigan D, Pettorini B (2025) Creating a selective dorsal rhizotomy team. In: Morota N, Steinbok P (eds) *Dorsal rhizotomy: neurosurgery for childhood spasticity. Advances and Technical Standards in Neurosurgery*, vol 51. Springer, Cham, pp 53–63. https://doi.org/10.1007/978-3-031-86441-4_5
4. Kija E, Namata TT, Sebunya R (2025) Management of cerebral palsy in low- and middle-income countries. *Semin Pediatr Neurol* 55:101202. <https://doi.org/10.1016/j.spen.2025.101202>
5. McLaughlin J, Bjornson K, Temkin N et al (2002) Selective dorsal rhizotomy: meta-analysis of three randomized controlled trials. *Dev Med Child Neurol* 44:17–25. <https://doi.org/10.1111/j.1469-8749.2002.tb00254.x>
6. Park TS, Liu JL, Edwards C, Walter DM, Dobbs MB (2017) Functional outcomes of childhood selective dorsal rhizotomy 20 to 28 years later. *Cureus* 9:e1256. <https://doi.org/10.7759/cureus.1256>
7. Valluri H, Mohanty M, Ramirez Mongil C, Fuentes G, Sultan T, Torres AR (2025) Investigating the burden of cerebral palsy in low- and middle-income countries: implications and priorities for pediatric neurology. *Semin Pediatr Neurol* 55:101225. <https://doi.org/10.1016/j.spen.2025.101225>
8. van Dijk LMM, Slot KM, Novacheck TF, Buizer AI, Langerak NG, SDR working group (2025) Selective dorsal rhizotomy from indication to rehabilitation: a worldwide survey. *Childs Nerv Syst* 41:133. <https://doi.org/10.1007/s00381-025-06786-5>

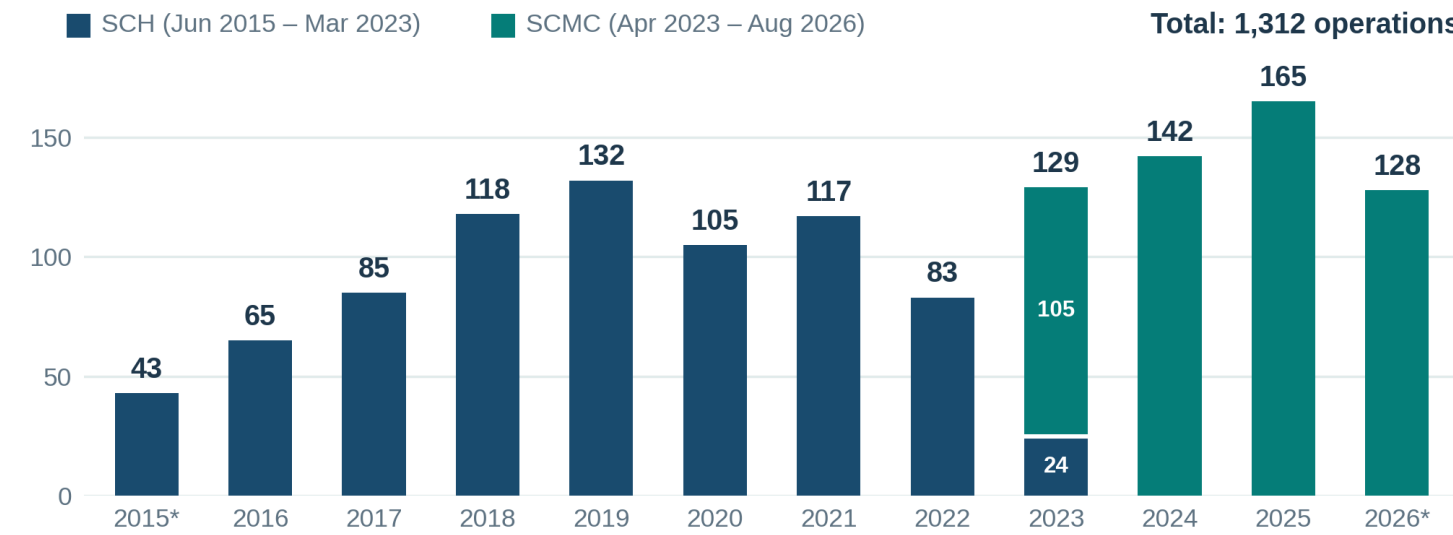
9. World Health Organization (2007) Everybody’s business: strengthening health systems to improve health outcomes. WHO’s framework for action. World Health Organization, Geneva
10. Xiao B (2025) Rootlet selection by crescendo single-pulse evoked compound muscle action potential interpretation during selective dorsal rhizotomy. In: Morota N, Steinbok P (eds) Dorsal rhizotomy: neurosurgery for childhood spasticity. Advances and Technical Standards in Neurosurgery, vol 51. Springer, Cham, pp 123–138. https://doi.org/10.1007/978-3-031-86441-4_10
11. Xiao B, Constantini S, Browd SR, Zhan Q, Jiang W, Mei R (2020) The role of intra-operative neuroelectrophysiological monitoring in single-level approach selective dorsal rhizotomy. Childs Nerv Syst 36:1925–1933. <https://doi.org/10.1007/s00381-019-04408-5>
12. Xiao B, Jiang W, Morota N et al (2025) A preliminary assessment on reproducibility of triggered electromyography during selective dorsal rhizotomy. Oper Neurosurg 29:255–262. <https://doi.org/10.1227/ons.0000000000001443>

Figures

a Service milestones



b Annual SDR operations



Transient proximal right weakness, episodes by year of surgery (n = 11)

0	0	0	5	4	2	0	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---

Figure 1

Development of the service. a Service milestones. b Annual number of SDR operations, June 2015 to August 2026, by hospital; the numbers inside the 2023 column give the operations performed at each hospital in that year. The row beneath the panel gives the number of episodes of transient proximal right lower-limb weakness by year of surgery (n = 11). *2015, June to December; 2026, January to August. SCH, Shanghai Children's Hospital; SCMC, Shanghai Children's Medical Center.

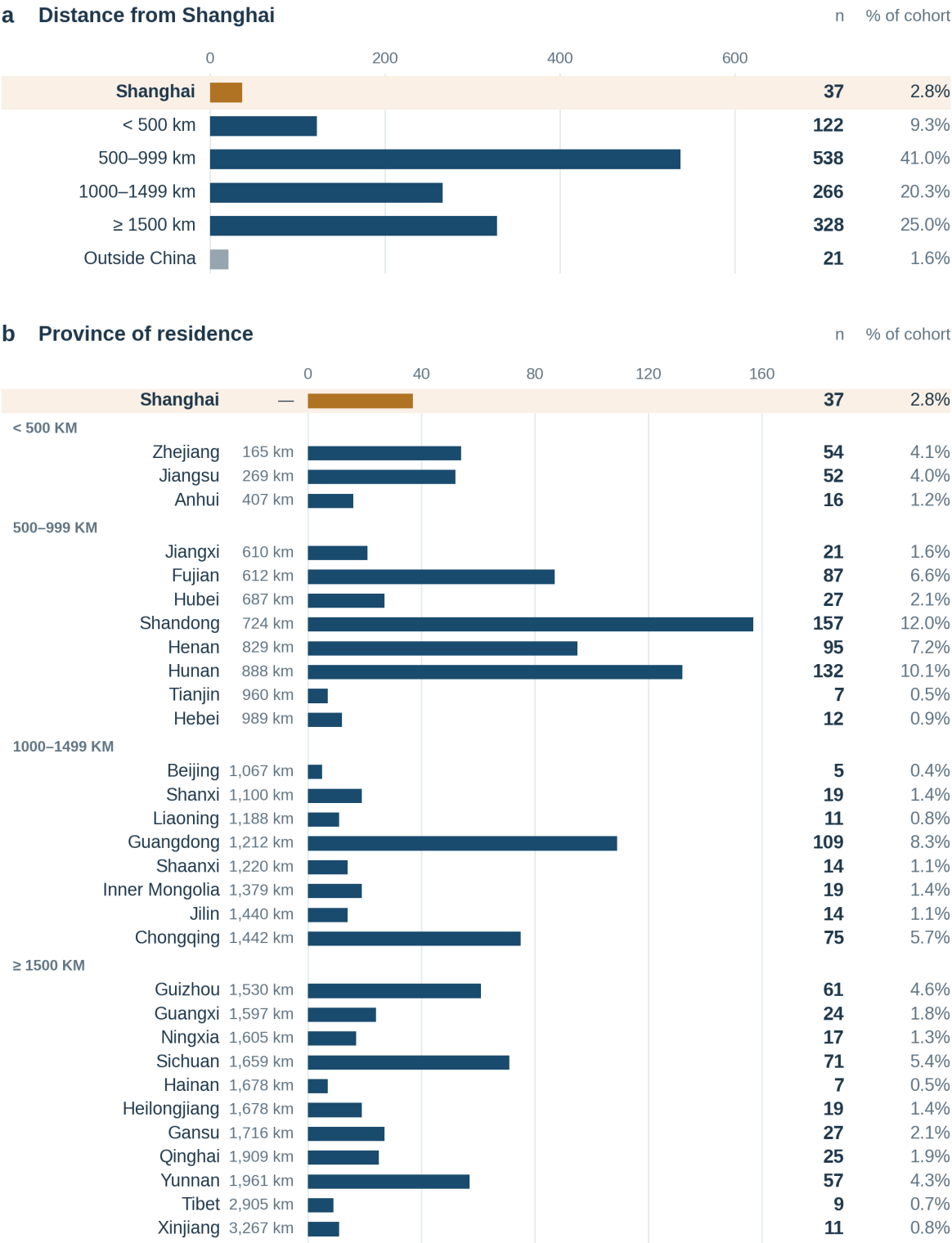
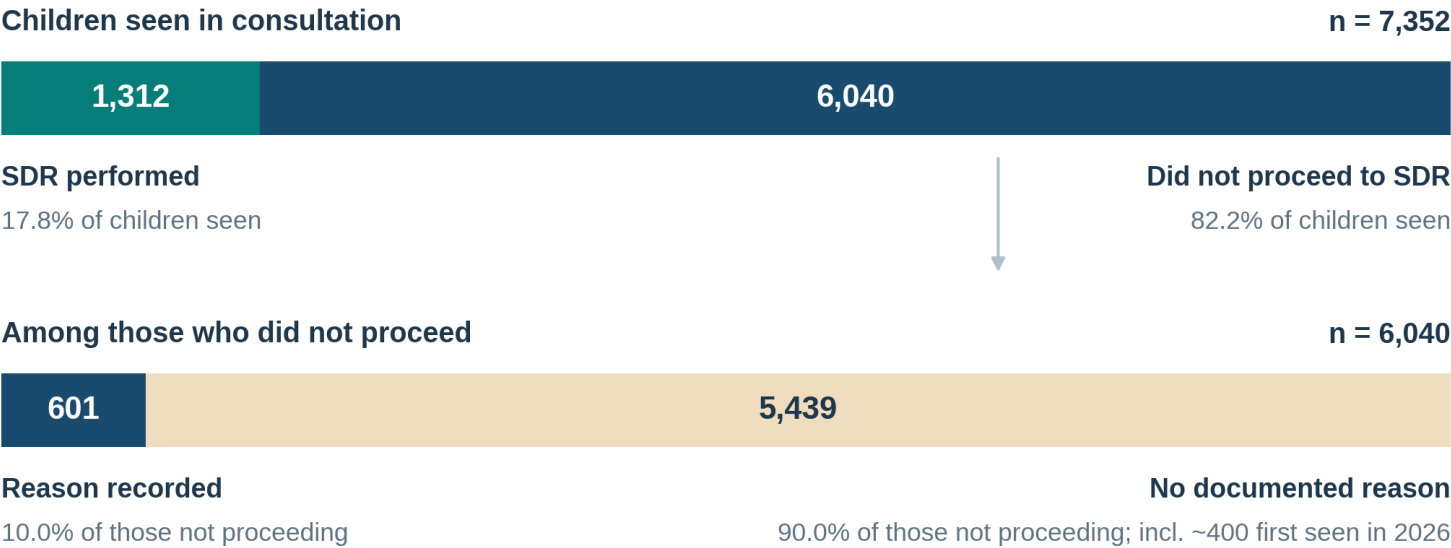


Figure 2

Residence of the 1312 patients. a Patients by great-circle distance from Shanghai to the capital of the province of residence. b Province of residence, grouped by distance band and ordered by distance within each band; the 21 patients living outside China are shown in a only.

a Consultation and decision status



b Recorded reasons for not proceeding (n = 601)



Figure 3

Pathway from consultation to surgery. a Of 7352 children seen in consultation, 1312 proceeded to surgery. Of the 6040 who did not, a reason was documented for 601 and not for 5439, of whom approximately 400 were first seen in 2026. b Documented reasons for not proceeding (n = 601); each child is classified by one main reason, and percentages may not sum to 100 because of rounding. Investigations were requested according to the clinical question rather than as sequential steps and are reported in Methods.

