

Supplementary materials

Table 1. Postoperative management and rehabilitation protocols.

Component	Intervention (Group)	Dosage and Duration	Primary Therapeutic Rationale	Supporting Evidence
Anti-inflammatory therapy	Prednisone or dexamethasone (Groups I-III)	Prednisone 60 mg daily with taper over 10 days or dexamethasone 20 mg daily with gradual taper	Reduction of perineural edema and inflammatory cascades that impair nerve conduction and axonal regeneration in acute peripheral facial nerve injury	Improving functional recovery through anti-inflammatory and anti-edema effects (Sullivan et al., 2007; Salinas et al., 2010; Gronseth and Paduga, 2012)
Neurotropic vitamin support	Vitamin B6 (Groups I-III)	50-100 mg daily for 30 days	Support of neuronal metabolism and peripheral nerve viability during regeneration	Peripheral nerve metabolic support and repair processes (Calderon-Ospina and Nava-Mesa, 2020; Scott et al., 2011)
Electrical neuromuscular stimulation	Transcutaneous electrical nerve stimulation, TENS (Groups II-III)	30 Hz, 2-6 mA, 100 μ s pulse width, 10 min per session; 10 sessions per course, repeated at 3-month intervals	Enhancement of muscle excitability, promotion of axonal sprouting, and facilitation of functional reinnervation after facial nerve injury	Recovery in peripheral facial paralysis and postoperative facial palsy (Yoo et al., 2023; Di Pietro et al., 2023; Krauß et al., 2024)
Neurometabolic support	Pyrimidine nucleotides (Nucleo CMP-forte) (Group III)	Intramuscular administration followed by oral course	Support of phospholipid synthesis, membrane repair, and remyelination during peripheral nerve regeneration	Experimental and clinical studies suggest uridine and cytidine derivatives support peripheral nerve repair and neurometabolic recovery (Wurtman et al., 2006; Gutiérrez-Fernández et al., 2011; Kang et al., 2020)
Vestibular symptom control	Cinnarizine plus dimenhydrinate (Arlevert) (Group III)	2-3 times daily for up to 20 days	Management of postoperative vertigo and dizziness to improve tolerance and adherence to rehabilitation	The cinnarizine-dimenhydrinate combination is effective for vertigo and vestibular symptoms after inner ear and skull base disorders (Scholtz et al., 2012; Strupp et al., 2016)
Microcirculatory and edema support	Diosmin (Venosmin) (Group III)	500 mg twice daily, then 1,000 mg daily	Reduction of capillary permeability, edema, and oxidative stress in	Anti-inflammatory, antioxidant, and microcirculatory effects, primarily in venous and

			the postoperative period	lymphatic disorders, supporting its use as adjunctive postoperative therapy (Manthey et al., 2001; Bogucka-Kocka et al., 2013)
Multimodal rehabilitation strategy	Combined TENS plus pharmacological support (Group III)	As described above	Simultaneous targeting of inflammation, neuromuscular activation, metabolic support, and symptom control to optimize the biological environment for nerve recovery	Multimodal rehabilitation approaches are increasingly recommended in peripheral nerve injury to address multiple regenerative pathways (Tian et al., 2024; Tessa et al., 2024)

Table 2. Dynamics of clinical symptom resolution in patients with intraoperative facial nerve injury prior to treatment, and at 3- and 12-month follow-up.

	Group I (n = 44)			Group II (n = 41)			Group III (n = 42)		
	Standard treatment protocol			Standard treatment protocol and electrical stimulation			Modified treatment protocol and electrical stimulation		
	Before treatment	3 months after treatment	12 months after treatment	Before treatment	3 months after treatment	12 months after treatment	Before treatment	3 months after treatment	12 months after treatment
Facial muscle weakness, n (%)	43 (97.73)	33 (75.00)	26 (59.09)	40 (95.12)	34 (82.93)	21 (51.22)	40 (95.24)	24 (57.14)	11 (26.19)
Reduced tolerance to high- frequency sounds, n (%)	11 (25.00)	10 (22.73)	9 (20.45)	10 (24.39)	10 (24.39)	9 (21.95)	11 (26.19)	10 (23.8 1)	4 (9.52)
Increased muscle tension on the unaffected side, n (%)	13 (29.5)	10 (22.73)	9 (20.45).	12 (29.27)	10 (24.39)	8 (19.51)	13 (30.95)	10 (23.81)	6 (14.29)
Involuntary muscle twitching, n (%)	20 (45.45)	15 (34.09)	13 (29.55)	21 (51.22)	13 (31.71)	11 (26.83)	21 (50.00)	11 (26.19)	8 (19.04)
Impaired taste sensation, n (%)	18 (40.91)	15 (36.09)	13 (29.55)	8 (43.90)	3 (31.71)	1 (26.83)	18 (42.86)	11 (26.19)	8 (19.05)
Facial hyperesthesia, n (%)	5 (11.36)	3 (6.82)	3 (6.82)	4 (9.76)	8 (19.51)	2 (4.88)	5 (11.90)	3 (7.14)	2 (4.76)
Hypoacusis without progressio n (%)	36 (81.82)	36 (81.82)	35 (79.5)	36 (87.80)	35 (85.37)	34 (82.93)	38 (90.48)	36 (85.7)	35 (83.3)
Ocular dryness, n (%)	26 (63.41)	22 (50.00)	3 (6.82)	28 (68.29)	23 (56.12)	20 (48.78)	26 (61.90)	18 (42.86)	11(26.19)

Lacrimation, n (%)

10 (22.73) 7 (15.91) 6 (13.64) 11 (26.83) 9 (21.45) 8 (19.51) 11 (26.19) 8 (19.05) 5 (11.90)

**Pain sensation in the mastoid
region of the temporal
bone, n (%)**

22 (50.0) 20 (45.45) 9 (40.91) 24 (58.54) 18 (43.90) 18 (43.90) 24 (57.14) 13 (30.95) 9 (21.43)
