

# Clinical Characteristics, Treatment Response and Sequelae of Bell's Palsy in Neurological Institute of Thailand

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**Background:** The prognosis of Bell's palsy is favorable. However, many patients still have residual facial weakness and sequelae such as synkinesis and hemifacial spasm. Currently, there is no adequate information on treatment response and sequelae of Bell's palsy in Thai adult patients.

**Objective:** 1) To determine clinical characteristics, treatment response, and sequelae of Bell's palsy including synkinesis and hemifacial spasm in Thai adult patients and 2) to find factors associated with early recovery and sequelae of Bell's palsy.

**Materials and Methods:** A retrospective chart review of patients diagnosed with Bell's palsy between January 1, 2015 and December 31, 2022, was performed.

**Results:** Three hundred two Bell's palsy patients were identified. Females were predominant at 63.2%. The mean age at onset was 49.3 years, and the median disease duration was two days. Nineteen-point five percent of the patients had diabetes, 31.8% had associated symptoms, and the most common symptom was postauricular pain at 21.5%. Additionally, 11.9% had recurrent Bell's palsy in which two attacks of Bell's palsy were noted. The median time from the previous episode was three years. Most patients received oral prednisolone within one week for 96.7%. Seventy-nine-point eight percent of the patients had partial recovery within four weeks after onset. Most associated symptoms were resolved in 12 weeks for 91%. The overall recovery rate was not different between diabetic and non-diabetic patients at 100% versus 99.2%. Severe steroid side effects were not present. Seven-point nine percent of the patients had synkinesis, which started at 24 weeks and 3.6% had hemifacial spasm, which started at 12 weeks. Factors related to synkinesis and hemifacial spasm were no improvement of facial muscle movement at four weeks after the onset.

**Conclusion:** Factors related to synkinesis and hemifacial spasm were no improvement of facial muscle movement at four weeks after onset. Longer follow-up, for at least one year, is needed to detect the sequelae of Bell's palsy especially in delayed recovery patients.

**Keywords:** Bell's palsy; Outcome; Predictor; Synkinesis; Hemifacial spasm

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Bell's palsy, or idiopathic facial paralysis, is the most common cause of lower motor neuron facial palsy. The cause of Bell's palsy is still unknown. The annual incidence of Bell's palsy in the general population has ranged from 10 to 40 per 100,000 persons<sup>(1-4)</sup>. Males and females were equally affected. The mean age at onset was 40 years. The incidence rate was higher in patients aged older than 65 years<sup>(1,2)</sup>. Bell's palsy is characterized by acute onset and

unilateral facial palsy that progresses and reaches its peak within the first 72 hours<sup>(1)</sup>. The associated symptoms were postauricular pain, hyperacusis, dysgeusia, and subjective change of facial sensation. These associated symptoms were present in 5% to 45% of the cases<sup>(5)</sup>.

The overall prognosis of Bell's palsy is favorable. Seventy percent of patients had complete recovery without treatment<sup>(6)</sup>. Complete recovery was increased up to 90% in patients with appropriate treatment. Corticosteroids are the mainstay of treatment for Bell's palsy. Early treatment with corticosteroids in the first 72 hours after onset is recommended. The regimen is 50 mg prednisone for 10 days, or 60 mg for the first five days, then reduced by 10 mg daily for the next five days<sup>(7)</sup>. Both regimens are effective and improve recovery rates<sup>(8)</sup>. Eighty-five percent of patients had some recovery in the first three weeks. Poor prognostic factors for treatment outcome were older age, diabetes, hypertension, severe facial palsy,

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history of recurrence of Bell's palsy, hearing defect, decreased tearing, persistent pain, the duration between onset and treatment longer than seven days, and the time before starting recovery<sup>(9-11)</sup>. Ten percent of the patients still have residual facial weakness. Sixteen percent had sequelae, such as hemifacial spasm or synkinesis, despite having received an appropriate treatment<sup>(6)</sup>. Synkinesis and hemifacial spasm are consequences of Bell's palsy. Synkinesis is involuntary movements of facial muscle. Hemifacial spasm is a jerking of facial muscles including eyelid, cheek, and mouth on the same side of face. Mechanism of synkinesis and hemifacial spasm are the result of 1) ephaptic transmission of nerve impulse along one axon fires up an adjacent axon, 2) aberrant facial nerve regeneration, and 3) synaptic reorganization of facial nerve nucleus<sup>(12)</sup>. Sequelae of Bell's palsy such as synkinesis and hemifacial spasm are related to severity of facial nerve dysfunction<sup>(12,13)</sup>. These sequelae cause functional, cosmetic, and psychosocial impairments for the patients. However, current information about early recovery and sequelae including synkinesis and hemifacial after Bell's palsy have not been reported. Identifying patients at risk of poor response and acquiring sequelae is needed.

The primary objective of the present study was to determine the clinical characteristics, associated symptoms, treatment response, and the sequelae of Bell's palsy including synkinesis and hemifacial spasm in Thai adult patients. The predictors for early recovery and sequelae of Bell's palsy were the secondary objective.

## Materials and Methods

After approval from the Institutional Review Board (IRB) (ethic number 63059), a retrospective study was conducted at the Neurological Institute of Thailand. The disease diagnosis registries were searched for the diagnosis of Bell's palsy or facial palsy between January 1, 2015 and December 31, 2022. Inclusion criteria were Bell's palsy patient, aged over 18 years, clinically diagnosed based on the definition of acute onset unilateral lower motor neuron facial palsy, and excluded of other causes. Patients with other causes of facial palsies, such as central nervous system disorders, trauma, and Ramsay Hunt syndrome, or those lost to follow-up before clinical improvement, were excluded.

Once idiopathic Bell's palsy patients were identified, their medical records were reviewed to collect demographic data, clinical manifestation, associated symptoms, duration of symptoms, and

clinical course. All patients were evaluated for treatment response, time to start recovery of facial muscle function, resolution of associated symptoms, and disease sequelae including synkinesis and hemifacial spasm. The time to recovery and recovery of facial muscle function were judged by attending physicians. The recovery of facial muscles functions was indicated by improvement of eye closure, eye blinking, raise the eyebrows, with movement of mouth and lips. Only partial recovery of facial muscles functions was analyzed in the present study because patients were lost to follow-up when they started to partially recover. Sequelae of Bell's palsy including synkinesis and hemifacial spasm, were evaluated. Synkinesis is involuntary movements of facial muscles which are 1) ocular-oral synkinesis as involuntary cheek lifting when a patient closes their eyes, 2) oral-ocular synkinesis as involuntary eye contraction when patient attempts to smile, and 3) crocodile tears as involuntary lacrimation or tearing when patient eats or drinks. Hemifacial spasm is a jerking of facial muscles including eyelid, cheek, and mouth on the same side of face. Early recovery was defined as clinical improvement within four weeks after onset. Prognostic factors related to early recovery and sequelae of Bell's palsy were analyzed.

## Statistical analysis

Descriptive summaries were presented as frequencies and percentages for categorical variables, median/mean, and ranges for continuous variables. The t-test was used to compare two groups of continuous data which are both normally distributed. The Mann-Whitney U test was used when the requirement of normal distribution for the t-test was not met. Comparisons between early recovery versus delayed recovery patients and Bell's palsy with or without sequelae were performed using Fisher's exact test or Pearson's chi-square test. Pearson's chi-square test was used when expected frequencies of more than five or expected frequencies less than five in less than 20% of the cells. Fisher's exact test was used when more than 20% of the cells had expected frequencies of less than five. All tests were two-sided, and p-values less than 0.05 were considered statistically significant. Statistical analyses were performed using SPSS Statistics for Windows, version 16.0 (SPSS Inc., Chicago, IL, USA).

## Results

### Demographic characteristics

Between January 1, 2015 and December 31,

**Table 1.** The demographic and clinical characteristics of Bell's palsy patients

	Total (n=302)	Early recovery (n=244)	Delayed recovery (n=58)	p-value
Sex; n (%)				0.416†
Male	111 (36.8)	87 (35.7)	24 (41.4)	
Female	191 (63.2)	157 (64.3)	34 (58.6)	
Age at onset (years); mean [SD]	49.3 [13.7]	48.6 [13.9]	51.9 [13.1]	0.103‡
Disease duration (days); median (IQR 25, 75)	2.0 (1.0, 4.0)	2.0 (1.0, 3.0)	2.0 (1.0, 5.0)	0.153♦
Underlying disease; n (%)				
No underlying disease	192 (63.6)	158 (64.8)	34 (58.6)	0.383†
Diabetes	59 (19.5)	44 (18.0)	15 (25.9)	0.273†
Hypertension	90 (29.8)	74 (30.3)	16 (27.6)	0.692*
Body weight (kg); mean [SD]	67.8 [15.1]	67.5 [15.0]	68.8 [15.2]	0.566‡
Side of facial palsy; n (%)				0.094†
Right	142 (47.0)	109 (44.7)	33 (56.9)	
Left	160 (53.0)	135 (55.3)	25 (43.1)	
Recurrent Bell's palsy; n (%)	36 (11.9)	32 (13.1)	4 (6.9)	0.189†
Same side	12/36 (33.3)	10/32 (31.3)	2/4 (50.0)	
Opposite side	24/36 (66.7)	22/32 (68.7)	2/4 (50.0)	
Duration of recurrent episode (years); median (IQR 25, 75)	3.0 (1.5, 3.8)	3.0 (1.5, 4.2)	3.2 (1.8, 4.0)	0.152♦
Associated symptoms; n (%)	96 (31.8)	77 (31.6)	19 (32.8)	0.860†
Ear pain	65 (21.5)	51 (20.9)	14 (24.1)	0.344*
Hyperacusis	2 (0.7)	0 (0.0)	2 (3.4)	0.083*
Tinnitus	15 (5.0)	12 (4.9)	3 (5.2)	0.662*
Dysgeusia	16 (5.3)	14 (5.7)	2 (3.4)	0.364*
Dizziness/vertigo	6 (2.0)	4 (1.6)	2 (3.4)	1.000*
Facial hypoesthesia	25 (8.3)	22 (9.0)	3 (5.2)	0.183*
Treatment; n (%)				
Prednisolone	292 (96.7)	238 (97.5)	54 (93.1)	0.104*
Acyclovir	32 (10.6)	26 (10.7)	6 (10.3)	0.945†
Rehabilitation	140 (46.4)	114 (46.7)	26 (44.8)	0.751†
Sequelae of Bell's palsy; n (%)	35 (11.6)	21 (8.6)	14 (24.1)	0.003†
Synkinesis	24 (7.9)	15 (6.1)	9 (15.5)	0.028*
Hemifacial	11 (3.6)	6 (2.5)	5 (8.6)	0.040*

SD=standard deviation; IQR=interquartile range

Data analysis by \* Fisher's exact test, † Pearson's chi-square test, ♦ Mann-Whitney U test, ‡ t-test

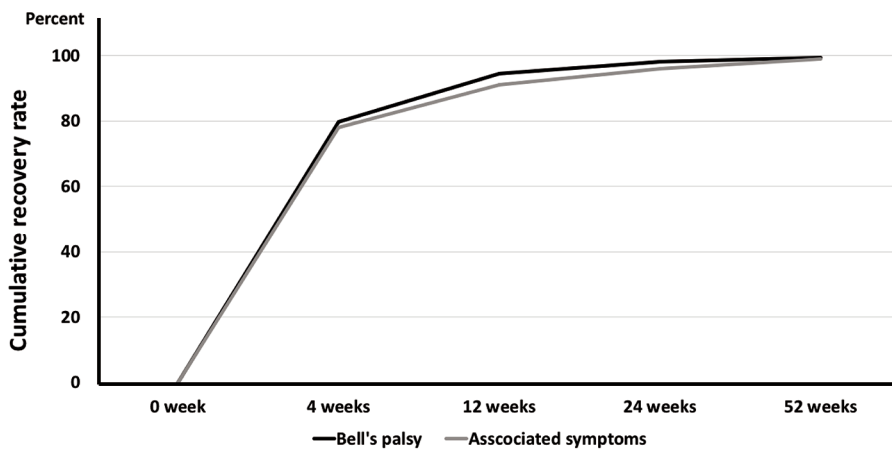
2022, 302 idiopathic Bell's palsy patients were included. The demographic and clinical characteristics are shown in Table 1. Patients in the present study were 111 males (36.8%) and 191 females (63.2%). The mean age at the onset was 49.3 (SD 13.7) years. The median disease duration prior to the initial evaluation was two days (IQR 1.0, 4.0). For comorbidity, 63.6% had no underlying disease, 19.5% had diabetes, and 29.8% had hypertension. Both sides of facial nerve were equally involved with 53% on the left and 47% on the right. Associated symptoms were present in 96 patients (31.8%) which were present alone or in combination. The most commonly associated symptom was postauricular pain at 21.5%, followed by facial hypoesthesia at 8.3%, dysgeusia

at 5.3%, tinnitus at 5%, dizziness at 2%, and 1% had hyperacusis.

Approximately 11.9% of patients had recurrent Bell's palsy and all of these patients had only two attacking episodes of facial weakness. Among recurrent Bell's palsy patients, 50% had Bell's palsy before the present study, and another 50% of the patients had their first Bell's palsy during the present study, and then recurred afterwards. Ipsilateral recurrence attack was 33.3%, while contralateral recurrence attack was 66.7%. The median interval between the Bell's palsies was three years (IQR 1.5, 3.8).

#### Treatment and disease outcome

Most patients were treated with oral prednisolone



**Figure 1.** The cumulative recovery rate of Bell's palsy and associated symptoms.

at 96.7%. These patients received oral prednisolone within one week of the onset, and the median duration was two days (IQR 1, 4). Ten percent of patients received Acyclovir, and 46.4% underwent facial nerve stimulation (Table 1).

The median follow-up duration in the present study was 12 weeks (IQR 4, 52). The cumulative recovery rate of Bell's palsy and associated symptoms are shown in Figure 1. Most patients had early recovery, 79.8% recovered within four weeks after onset. The cumulative recovery rate of Bell's palsy was 94.4% at 12 weeks, 98% at 24 weeks, and 99.3% at 12 months. In the present study, 3.3% of the patients did not receive oral prednisolone. However, recovery rates did not differ from those received oral prednisolone. At four weeks after onset, the cumulative recovery rate of Bell's palsy who had diabetes was slightly lower at 74.6 versus 82.0% ( $p=0.203$ ). However, at a 12-month follow-up, the overall recovery rate was not different between diabetic and non-diabetic patients at 100% versus 99.2% ( $p=0.693$ ). Severe steroid side effects in diabetic patients, such as uncontrollable hyperglycemia, diabetic ketoacidosis, or infection, were not found.

Most associated symptoms were resolved within 12 weeks, while 78.1% of the patients with associated symptoms were resolved in four weeks, and 91% were resolved in 12 weeks. At the four weeks after onset, associated symptoms remained in 21 patients (20.2%), which were postauricular pain for 3%, facial hypoesthesia for 1.7%, tinnitus for 1%, and dizziness for 1%. Of these 21 patients, 16 patients (76%) had improvement of Bell's palsy, even if associated symptoms remained. Prolonged postauricular pain

was not related to delayed recovery. Six out of nine patients (66.7%) had improvement in Bell's palsy even though postauricular pain persisted. In addition, other associated symptoms were not associated with recovery of Bell's palsy.

In the present study, 24 patients (7.9%) had synkinesis. Synkinesis started at 24 weeks after the onset, and the mean duration to develop synkinesis was 52 weeks (IQR 24,78) after disease onset. Among patients with synkinesis, 87.5% had ocular-oral synkinesis, 75% had oral-ocular synkinesis, and 50% had crocodile tears. Synkinesis was more common in delayed recovery patients at 15.5% versus 6.1% ( $p=0.028$ ). Eleven patient (3.6%) had hemifacial spasm, started at 12 weeks after onset, and the median duration to develop hemifacial spasm was 24 weeks (IQR 24, 56) after disease onset. Hemifacial spasms were also more common in delayed recovery patients at 6.8% versus 2.4% ( $p=0.040$ ).

Clinical features, including gender, age, underlying disease, associated symptoms, steroid therapy, and duration before treatment, were analyzed to identify factors related to early recovery (Table 1) and sequelae of Bell's palsy including synkinesis and hemifacial spasm (Table 2). Factors related to the sequelae of Bell's palsy were no improvement of facial muscle movement at four weeks after onset. Patients with no recovery at four weeks after the onset had a risk of synkinesis and hemifacial spasm higher than patients with early recovery around 3.38 time (OR 3.38, 95% CI 1.67 to 7.15,  $p=0.001$ ). However, factors related to early recovery were not found.

## Discussion

Bell's palsy is the most common cause of lower

**Table 2.** The factors related to synkinesis or hemifacial spasm

	Patients with synkinesis or hemifacial spasm (n=35)	Patients without synkinesis or hemifacial spasm (n=267)	p-value	OR (95% CI)
Sex; n (%)			0.747†	1.13 (0.54 to 2.37)
Male	12 (34.3)	99 (37.1)		
Female	23 (65.7)	168 (62.9)		
Age at onset (years); mean [SD]	48.1 [13.7]	49.3 [13.8]	0.615◇	0.99 (0.97 to 1.02)
Disease duration (days); median (IQR 25, 75)	2.0 (1.0, 5.0)	2.0 (1.0, 4.0)	0.725◆	0.28 (0.99 to 1.02)
Underlying disease: diabetes; n (%)	7 (20.0)	53 (19.9)	0.983†	1.01 (0.42 to 2.44)
Associated symptoms: ear pain; n (%)	10 (28.6)	55 (20.6)	0.281†	1.54 (0.67 to 3.40)
Treatment; n (%)				
Prednisolone	34 (97.1)	258 (96.6)	1.000†	1.19 (0.15 to 9.65)
Acyclovir	6 (17.1)	26 (9.7)	0.236†	1.92 (0.73 to 5.05)
Rehabilitation	16 (45.7)	124 (46.4)	0.935†	0.97 (0.48 to 1.97)
No recovery at 4-week; n (%)	14 (40.0%)	48 (18.0%)	0.001†	3.38 (1.60 to 7.15)

SD=standard deviation; IQR=interquartile range; OR=odds ratio; CI=confidence interval

Data analysis by \* Fisher's exact test, † Pearson's chi-square test, ◆ Mann-Whitney U test, ◇ t-test

motor neuron facial palsy. The annual incidence of Bell's palsy ranged from 20 to 30 per 100,000 persons<sup>(2)</sup>. In Thailand, the incidence of Bell's palsy has been unknown. However, the annual hospital incidence of Bell's palsy in tertiary hospitals was 39.6 per 10,000 persons. Males and females were equally affected but was more commonly seen in females. The age at onset varied from 20 to older than 60 years old<sup>(9,14)</sup>. In the present study, the mean age at the onset was 49.2 years, and females were prominent. The demographic data were similar to the previous studies<sup>(1-4,9,14)</sup>.

Recurrent Bell's palsy is uncommon, and the etiology is unclear. In the previous study, 2.6% to 15% of patients had recurrent Bell's palsy, affecting the ipsilateral or contralateral side. The duration from the previous episode was 2 to 33 years<sup>(15)</sup>. From another study, the recurrent rate of Bell's palsy was 9.4%<sup>(9)</sup>. In the present study, recurrent Bell's palsy was 11.9%. All recurrent Bell's palsy patients had two attacking episodes. The median time from the previous attack episode was three years (IQR 1.5, 3.8). Recurrent ipsilateral attacks were 33.3%, and recurrent alternating (contralateral) attacks were 66.7%. In the previous report, recurrent Bell's palsy was associated with systemic comorbidities such as diabetes, hypertension, or pregnancy<sup>(15,16)</sup>. However, the present study did not show such a correlation.

Associated symptoms were common in the present study. The most commonly associated symptom was postauricular pain with 20.9%, followed by facial hypoesthesia in 8.3%, dysgeusia in 5.3%, and tinnitus in 5%. Dizziness and vertigo were uncommon. Only 1% of patients had dizziness

or vertigo. Within this context, central vertigo or other causes of facial palsy should be considered in Bell's palsy patients with dizziness or vertigo. In the present study, Bell's palsy and the associated symptoms are resolved together. Most associated symptoms were resolved in four weeks and no longer than 12 weeks, and the resolution of associated symptoms, such as postauricular pain, were not related to early recovery.

Corticosteroids are thought to reduce inflammation and edema in facial nerves. Early treatment with corticosteroids within 72 hours of onset is recommended, and complete recovery is increased up to 90% in patients with steroid treatment<sup>(4)</sup>. Most patients in the present study received oral prednisolone, and 79.8% had recovery in the first month, 94.4% in three months, and 99.3% in one year. The present study's results support the benefit of early treatment with oral prednisolone. Based on the present study's result, the prognosis of Bell's palsy is favorable. If patients did not recover within three months, further investigation, such as a computed tomography (CT) scan or magnetic resonance imaging (MRI), should be considered. In the previous non-double-blinded studies, a combination of corticosteroid and antiviral drugs showed benefit in severe Bell's palsy patients<sup>(17,18)</sup>. However, the combination of oral prednisolone and Acyclovir did not show benefit in the present study. Many patients in the study were diabetic, but there was no profound side effect of steroids found. Therefore, corticosteroids are safe in diabetic patients with Bell's palsy. However, blood sugar monitoring is recommended.

In the previous study, even with corticosteroid

treatment, 16% of patients still had sequelae such as synkinesis or hemifacial spasm<sup>(19)</sup>. Synkinesis is a common sequela of Bell's palsy. The frequency of synkinesis in Bell's palsy patients varies from 8.5% to 21.3%<sup>(13)</sup>, and synkinesis starts from 12 to 54 weeks<sup>(12)</sup>. Hemifacial spasm is also reported as a sequela of Bell's palsy. The frequency of hemifacial spasm in the previous study was 11%<sup>(20)</sup>. Sequelae of Bell's palsy was not rare in the present study, as 7.9% of patients had synkinesis and 3.6% of patients had hemifacial spasm even though they received corticosteroids. Hemifacial spasm started at 12 weeks, and synkinesis started at 24 weeks after the onset. The median follow-up duration in the present study was 12 weeks (IQR 4, 52). Some patients were lost to follow-up after four weeks because they had partial recovery. Therefore, the number of synkinesis and hemifacial spasm may be underestimated because patients were lost to follow-up before onset of hemifacial spasm and synkinesis. In the previous study, factors related to synkinesis were severe facial palsy and did not received corticosteroids within 72 hours<sup>(12,13)</sup>. Most of the patients in the present study had received corticosteroids, so unable to show the benefit of corticosteroids in preventing sequelae of Bell's palsy. However, the present study showed that no improvement of facial muscle movement at four weeks after onset was related to synkinesis and hemifacial spasm. These sequelae always remain, and patients suffer from undesired facial expressions, especially synkinesis. Recognition of synkinesis is important because appropriate treatment, such as Botulinum toxin-A injection and facial training still has benefits in synkinesis<sup>(20)</sup>. Therefore, a longer follow-up in partial recovery of Bell's palsy is needed to detect the sequelae of Bell's palsy.

The limitations of the present study were that it was a retrospective study, and the severity score of Bell's palsy, such as House-Brackley, was not recorded. Therefore, prognostic factors related to disease severity could not be analyzed.

In conclusion, the clinical characteristics of Bell's palsy in the present study were similar to the previous report in Thailand or Western countries. The recovery rate of Bell's palsy was favorable. However, approximately 7.9% of patients had synkinesis and 3.6% had hemifacial spasm, even though they received corticosteroids. No improvement of facial muscle movement at four weeks after onset was related to synkinesis and hemifacial spasm. Synkinesis started at 24 weeks after onset and the median duration was 52 weeks (IQR 24,78). Hemifacial spasm started at

12 weeks after onset, and the median duration to develop hemifacial spasm was 24 weeks (IQR 24, 56) after disease onset. Longer follow-up, of at least one year, is needed to detect the sequelae of Bell's palsy especially in delayed recovery patients.

### What is already known on this topic?

The overall prognosis of Bell's palsy is favorable. Recovery was increased with corticosteroids treatment. In diabetic patients, the cumulative recovery rate of Bell's palsy was similar to non-diabetic patients and severe steroid side effects were not found.

### What does this study add?

Associated symptoms such as postauricular pain and facial hypoesthesia are common. However, dizziness and vertigo are rare. Many patients still had sequelae of Bell's palsy, 7.9% had synkinesis and 3.6% had hemifacial spasm. The most common symptoms of synkinesis in this study were ocular-oral synkinesis, followed by oral-ocular synkinesis, and crocodile tears.

### Conflicts of interest

The authors declare there were no supporting grants and no conflicts of interest.

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