

# Antiviral agents convey added benefit over steroids alone in Bell's palsy; decompression should be considered in patients who are not recovering

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## Abstract

**Background:** The management of Bell's palsy has been the subject of much debate, with corticosteroids being the preferred medication. However, evidence also supports the use of antiviral drugs for severe cases and even decompression surgery in patients who, despite medical treatment, are not recovering.

**Method:** A literature review was conducted on the management of Bell's palsy.

**Results:** This paper describes the background, statistical evidence, study results and pathophysiological theories that support more aggressive treatment for patients with severe palsy and those who have inadequate recovery.

**Conclusion:** Combination therapy including antiviral medication significantly improves outcomes in patients with severe Bell's palsy. Decompression should be considered in patients who have not recovered with drug treatment.

**Key words:** Antiviral Agents; Facial Nerve; Treatment Outcome; Drug Therapy; Human

## Introduction

Disfiguring facial weakness, synkinesis, higher depression rates and lower self-esteem are some of the dramatic consequences of a non-completely recovered facial palsy.<sup>1,2</sup> There is probably no benign ailment that causes more physical and emotional suffering.<sup>3,4</sup> Therefore, everything should be done to promote recovery. Patients should be counselled and not forced into either therapy or 'watchful waiting'.<sup>5</sup> Contraindications to treatment may in individual cases outweigh the potential benefits.

Decision makers need to assess and appraise all levels of evidence; the strengths and weaknesses of each need to be understood if reasonable and reliable conclusions are to be drawn.<sup>6</sup> Much has been written about Bell's palsy in cohort and case studies. Every aspect of Bell's palsy has been the subject of a continuing dispute in the literature.<sup>7,8</sup> Therefore, anatomy, relevant pathophysiology, natural course of the disease, relevant pharmacotherapy or surgical procedures, success and failure rates, and possible side effects of therapy, need to be reconsidered.

## Pathophysiology

The term Bell's palsy is reserved for those cases in which there is no obvious cause (such as injury,

infection or tumour), or in which there is nothing to suggest a more centrally placed lesion.<sup>9</sup>

Although it refers to a supposedly 'idiopathic' lesion, many theories have been developed. Bell's palsy has been attributed to cold exposure, chill or rheumatism.<sup>10–12</sup> Nowadays, most literature suggests that Bell's palsy is caused by infection with the herpes simplex virus<sup>13–20</sup> or varicella zoster virus.<sup>21–25</sup> If this is true, the typical vesicles of the zoster are not present.

The inflammatory reaction against these viruses causes swelling of the facial nerve, which consequently becomes entrapped within its narrow bony canal.<sup>7,26</sup> Many authors have described the swollen nerve.<sup>21,27–30</sup> In the end, this theory might concur with a theory of ischaemic aetiology.<sup>31,32</sup> In cases of longstanding paralysis, the facial nerve was reduced to a shrunken strand.<sup>33,34</sup> Contrast enhancement of the facial nerve seen on magnetic resonance imaging, and the possible narrower canal on computed tomography scanning that patients with repeated palsies may have, provides circumstantial evidence that might support the theory.<sup>35,36</sup>

## Anatomy

The facial nerve runs through the temporal bone. The narrowest portion is found at the entrance. A tight

arachnoid band is found adherent to the nerve in this region, which contributes to the constriction.<sup>8,37</sup>

### Natural course

About 70 per cent of patients recover completely without any therapy,<sup>38,39</sup> and 15 per cent more might still have a 'good' recovery.<sup>40,41</sup>

Patients with an initial severe palsy, the elderly and patients with diabetes have a higher chance of non-recovery or complications.<sup>10,37,38,42–46</sup> There is a less than 50 per cent chance of a spontaneous, complete recovery in those aged over 60 years.

Herpes zoster oticus is associated with a worse outcome than Bell's palsy; pain might be suggestive of a zoster sine herpette.<sup>2,37,47</sup> The prognosis has been found to be worse when the onset of the palsy was accompanied by marked pain and loss of taste than when the onset was symptomless.<sup>9,27,41,47–49</sup>

Because of the high spontaneous recovery rate, it is interesting to examine cases of non-recovery and failure rates. How well does a specific treatment prevent a disfiguring result?

### Treatment

The main priority is to reduce nerve swelling. Corticosteroids are the first choice of treatment. Decompression gives more space to the swollen nerve. Given the probable viral pathogenesis, antiviral drugs could be useful.

### Function assessment, grading and success rates

The use of different grading scales for the assessment of dynamic facial nerve function makes comparison regarding Bell's palsy therapy difficult.<sup>50</sup> Of note, the commonly used House–Brackmann grading scale was mainly based on patients diagnosed with cerebello-pontine angle pathology. Is facial nerve function following such pathology comparable to Bell's palsy in terms of assessment?<sup>51–53</sup> A scale with more possibilities for differentiation and one that integrates subjective scoring by the patient – the movement, rest, secondary defects, and subjective scoring grading scale ('MoReSS'),<sup>54</sup> for example – might be advisable for future studies.

### Current treatment

Based on the 'probable pathophysiology', on the best available research and on our clinical expertise, the main points in Bell's palsy treatment are as follows. Firstly, treatment should start as early as possible. Secondly, treatment with steroids is indicated in most patients; the cost is low and the side effects are minor. Thirdly, one should identify the patients with a likelihood of non-recovery (House–Brackmann grades IV, V and VI), and treat them with a combination of steroids and antivirals. Fourthly, if complete recovery is not likely to be achieved, as can be assessed with electrophysiological tests (e.g. electroneurography

(ENoG) and electromyography (EMG)), the patients should be referred (if that is their wish) to the 'best' surgeons for decompression surgery as soon as possible.<sup>8,10,25,45,50,55–63</sup>

Over the last 15 years, patients in our clinics with moderate and severe palsy (House–Brackmann grades IV, V and VI) have been treated with corticosteroids and antivirals. Prednisone 1 mg/kg or 80 mg for one week is prescribed; we want a high dose for prompt relief of the nerve. In severe cases, valaciclovir 1000 mg three times a day for one week is prescribed.

This regime has been maintained because of the good results. With this medication scheme, indications for decompression surgery to treat Bell's palsy were rare. Surgical intervention can be helpful in those cases that do not respond to medical measures. The results of our clinical practice are in line with those of Yanagihara *et al.*,<sup>31</sup> which showed that the number of patients undergoing a decompression operation was in decline.

### Treatment revisited

What is the evidence for our protocol? This issue is important because on average 85 per cent of patients have a 'rather good' recovery without therapy. Furthermore, this percentage might be higher when corticosteroids are prescribed, and it will be difficult to prove any added value of antivirals or decompression surgery as there will be a ceiling effect.<sup>10,64,65</sup>

Our questions are as follows. Firstly, does antiviral medication, combined with steroids, improve the recovery of patients with severe palsy? Secondly, does decompression surgery ameliorate the outcome in severe cases that do not show improvement with medical therapy?

This paper is not just another new systematic review. Reviews on Bell's palsy have been published on many occasions. In those, the same articles seem to be reviewed over and over again. In our opinion, another meta-analysis with no new results would not be useful if any outcome was measured in the traditional way.<sup>66</sup> Therefore, we have used the data and reference lists of previous systematic reviews, but we focus on a different interpretation of the current literature.

### Antiviral medication

Over the last 75 years, a viral cause for Bell's palsy has been suggested. Therefore, antiviral treatment is likely to benefit patients, providing that treatment is started early and that the severe cases are given a high enough dose to cover an infection with varicella as well.<sup>15,22–24,66</sup>

Hato *et al.*<sup>25</sup> has previously described the difference in recovery in severely affected patients treated with combination therapy versus monotherapy steroid treatment in a retrospective study conducted in 2003. If the data from the paper by Quant *et al.*<sup>67</sup> are updated, the results of combination therapy in prospective trials are likely to be significantly better than those for monotherapy, with

an odds ratio of 1.712 (95 per cent confidence interval (CI) = 1.172–2.501) (Table I).<sup>19,24,43,63,68–71</sup>

Table II shows that the pooled odds ratio for patients with initial severe palsy recovering to at least House–Brackmann grade II is 1.985 (95 per cent CI = 1.334–2.952).<sup>9,24,43,63,68–73</sup>

Only one outlier exists, namely the study by Sullivan *et al.*<sup>68</sup> Criticism of that particular study has already been described extensively.<sup>74</sup>

In cases where the ENoG responsive level was less than 10 per cent compared to the contralateral side, indicating that patients had severe palsy, the recovery rate for combination therapy was 63.6 per cent (7 out of 11 patients recovered), and for steroids only it was 36.4 per cent (4 out of 11 patients recovered).<sup>71</sup> Twenty-eight per cent of patients on combination therapy showed recovery of four House–Brackmann points or more, versus only 11.9 per cent of patients on corticosteroids.<sup>70</sup>

As well as having a higher percentage of full recovery, combination therapy results in significantly fewer sequelae and fewer patients with an unsatisfactory recovery (worse than House–Brackmann grade III) compared with those treated with steroids only (Table III).<sup>25,63,70,71,75</sup> In the studies by Minnerop *et al.*<sup>70</sup> and Lee *et al.*,<sup>71</sup> the patients who did not recover to House–Brackmann grade IV were all in the monotherapy group. Synkinesis more frequently occurs following therapy with steroids only than following combination therapy.<sup>73,76</sup>

In line with the consistency criterion for causation, we could ask ‘has the outcome been repeatedly observed by different persons, in different places, circumstances and times?’<sup>77</sup> With combination therapy, broadly the same answer has been reached in quite a variety of situations. Hence, we can justifiably infer that the effect is not due to some constant error.

TABLE I  
PROSPECTIVE TRIALS COMPARING COMBINATION  
THERAPY WITH STEROIDS ONLY\*

Study	Successes/failures (n)	
	Steroids	Combination therapy
Yeo <i>et al.</i> <sup>19</sup>	40/7	41/3
Adour <i>et al.</i> <sup>63</sup>	35/11	49/4
Hato <i>et al.</i> <sup>24</sup>	96/11	110/4
Sullivan <i>et al.</i> <sup>68</sup>	122/5	115/9
Engström <i>et al.</i> <sup>69</sup>	160/26	164/16
Minnerop <i>et al.</i> <sup>70</sup>	53/14	42/8
Lee <i>et al.</i> <sup>71</sup>	71/36	82/17
Ryu <i>et al.</i> <sup>43</sup>	74/18	91/19

Pooled values:  $I^2$  index = 27.4 per cent;  $p$ -value  $Q = 0.210$ ; meta-analysis random-effects model odds ratio = 1.712 (95 per cent confidence interval (CI) = 1.172–2.501). ‘Odd ones out’ principle values (deleting the studies with the most negative and most positive results, i.e. deleting Sullivan *et al.*<sup>68</sup> and Adour *et al.*<sup>63</sup>):  $I^2$  index = 0.0 per cent;  $p$ -value  $Q = 0.606$ ; meta-analysis random-effects model odds ratio = 1.787 (95 per cent CI = 1.277–2.500). \*Based on the meta-analysis by Quant *et al.*<sup>67</sup> (and their correction); the data of Ryu *et al.*<sup>43</sup> and Lee *et al.*<sup>71</sup> have been added.

TABLE II  
PROSPECTIVE TRIALS COMPARING COMBINATION  
THERAPY WITH STEROIDS ONLY IN PATIENTS WITH  
SEVERE PALSYS\*

Study	Successes/failures (n)	
	Steroids	Combination therapy
Yeo <i>et al.</i> <sup>19</sup>	23/7	23/2
Adour <i>et al.</i> <sup>63</sup>	5/5	7/3
Hato <i>et al.</i> <sup>24</sup>	71/11	88/4
Sullivan <i>et al.</i> <sup>68</sup>	19/2	23/5
Engström <i>et al.</i> <sup>69</sup>	19/19	20/19
Minnerop <i>et al.</i> <sup>70</sup>	8/9	13/5
Lee <i>et al.</i> <sup>71</sup>	71/36	82/17
Ryu <i>et al.</i> <sup>43</sup>	15/9	15/5

Pooled values related to the likelihood of ‘good’ recovery:  $I^2 = 0.0$  per cent;  $p$ -value  $Q = 0.493$ ; meta-analysis random-effects model odds ratio = 1.985 (95 per cent confidence interval (CI) = 1.334–2.952). ‘Odd ones out’ principle values (deleting the studies with the most negative and most positive results, i.e. deleting Sullivan *et al.*<sup>68</sup> and Yeo *et al.*<sup>19</sup>):  $I^2 = 0.0$  per cent;  $p$ -value  $Q = 0.636$ ; meta-analysis random-effects model odds ratio = 2.078 (95 per cent CI = 1.365–3.164). Based on a previous article;<sup>72</sup> the data of Ryu *et al.*<sup>43</sup> and Lee *et al.*<sup>71</sup> have been added. The Engström *et al.*<sup>69</sup> findings have been updated with data from Axelsson *et al.*<sup>73</sup>

Considering the above, we think that antiviral medication can improve recovery in patients with severe Bell’s palsy.

Davenport *et al.*<sup>78</sup> stated that the Scottish Bell’s palsy study was performed because of a concern regarding the longstanding acceptance of steroid use, and the increasing acceptance of acyclovir use, despite insufficient evidence. The authors concluded that ‘steroids are now evidence based, but we have shown acyclovir to be ineffective’. They urged colleagues to consider further trials rather than propagate the use of an unproven treatment.<sup>78</sup>

In our opinion, it should have been clear in 2000 that corticosteroids ameliorate the outcome. However, because of doubts regarding the longstanding acceptance of steroid use, two double-blind, randomised trials were performed at this point.<sup>68,69</sup> In these trials ( $n = 416$  and  $n = 245$ ), patients were randomised to receive no steroids. Of these, about 66 more (10 per cent – a conservative low estimate) would have recovered with steroids. In our opinion, this indicates a lot of

TABLE III  
NUMBERS OF PATIENTS WITH POOR RECOVERY, IN  
PROSPECTIVE AND RETROSPECTIVE STUDIES

Study	Design	Failures/total (n)	
		Steroids	Combination therapy
Adour <i>et al.</i> <sup>63</sup>	Prospective	11/46	4/53
Minnerop <i>et al.</i> <sup>70</sup>	Prospective	3/17	0/18
Lee <i>et al.</i> <sup>71</sup>	Prospective	10/107	5/99
Hato <i>et al.</i> <sup>25</sup>	Retrospective	44/386	4/94
Ahangar <i>et al.</i> <sup>75</sup>	Retrospective	22/248	11/248

missed chances for recovery. We urge colleagues not to ignore history once again when it comes to the use of antivirals.

### Combination therapy meta-analyses

Meta-analyses have generally concluded that antiviral therapy has no significant effect. However, if antiviral drugs have little added value when all patients are considered without differentiation, this does not necessarily mean that specific groups might not benefit from their prescription.

There were a number of points raised in the recent meta-analyses (Table IV); these are described briefly below.<sup>62,67,79–82</sup>

Firstly, in the conclusion of the abstract, the Cochrane review does not refer to combination therapy, but only to antivirals versus placebo or corticosteroids.<sup>79</sup> This really is not the issue anymore.

Secondly, the Cochrane review ignores the fact that its own results indicate there was 'a significant but slight reduction in the rate of incomplete recovery, favouring the combination of antivirals and corticosteroids over corticosteroids alone; RR [relative risk] 0.64 (0.50 to 0.82)'.<sup>79</sup> Thus, only one study reports negative findings; yet still the Cochrane review concludes that antivirals, though in contradiction with their own calculations, are not effective. Does this reflect a bias given the overlap between the authors of the only study with negative findings and the Cochrane review authors?

Thirdly, the Cochrane review concludes that 'there was no significant difference in long-term sequelae comparing antivirals + corticosteroids with corticosteroids alone, RR [relative risk] = 0.39, (CI 95% = 0.14, 1.07)'.<sup>79</sup> This result might be clinically very relevant.

Fourthly, the study by Goudakos and Markou includes two trials that are not accessible to us, one of which, according to the title, appears not to concern Bell's palsy.<sup>81</sup>

Fifthly, an important fact in the meta-analysis by Quant *et al.*<sup>67</sup> is that the figures from Engström's trial have been reversed. If the analysis was performed with the correct figures, the odds ratio becomes 1.72

(95 per cent CI = 1.02–2.88).<sup>64</sup> The correct difference in the proportion of recovered patients amongst those who received steroids alone and those who received combination therapy now becomes 92.2 per cent minus 87.2 per cent. This 5 per cent is a clinically very relevant effect. Another effect of using the correct figures is that the heterogeneity index drops from 47.1 to 32.4 per cent, making a fixed-effects model instead of a random-effects model a serious option, resulting in a smaller confidence interval odds ratio of 1.69 (95 per cent CI = 1.12–2.53).

Sixthly, there are two meta-analyses that include trials in their funnel plot by means of a 'trim and fill' algorithm employed to correct for possible publication bias. Although this method can be valuable, it relies heavily on the assumption that unpublished, extremely negative studies exist. In fact, this is a very unlikely assumption when it concerns studies in which antivirals are used to treat a viral cause.<sup>67,82</sup>

Nevertheless, 'extreme' effects might be influencing outcomes. Therefore, we suggest using the 'odd ones out' principle as a sensitivity analysis, leaving out the studies with the most negative result (Sullivan *et al.*<sup>68</sup>) and the most positive result (Adour *et al.*<sup>63</sup> in Table I and Yeo *et al.*<sup>19</sup> in Table II). This method leads to a dramatic drop of the heterogeneity index in both tables ( $I^2 = 0.0$  per cent). This is mainly because of the removal of the Sullivan *et al.*<sup>68</sup> trial, which reported results that do not concur at all with our clinical expectations (i.e. that patients with severe palsy using a combination of antivirals and corticosteroids recover worse than those using corticosteroids only). In Table I, the odds ratio becomes 1.787 (95 per cent CI = 1.277–2.500) and in Table II it becomes 2.078 (95 per cent CI = 1.365–3.164). Both results indicate a larger effect of using combination therapy.

The real outlier would seem to be the Sullivan *et al.*<sup>68</sup> study. The authors suggested that the detrimental effect on recovery of antiviral medication could be due to a Jarisch–Herxheimer reaction.<sup>79</sup> In our clinical experience, we have never seen this reaction. Moreover, no other study has reported such an adverse effect.

TABLE IV  
OVERVIEW OF CONCLUSIONS MADE IN META-ANALYSIS STUDIES

Study	Year	Conclusion
Cochrane review <sup>79</sup>	2009	High quality evidence showed no significant benefit from anti-herpes simplex antivirals compared with placebo in producing complete recovery; moderate quality evidence showed that antivirals were significantly less likely than corticosteroids to produce complete recovery
De Almeida <i>et al.</i> <sup>80</sup>	2009	Corticosteroids associated with reduced risk of unsatisfactory recovery; antiviral agents, administered with corticosteroids, may be associated with additional benefit
Goudakos & Markou <sup>81</sup>	2009	Addition of an antiviral agent to corticosteroids not associated with an increase in complete recovery of facial motor function
Numthavaj <i>et al.</i> <sup>82</sup>	2011	Treatment with antivirals plus corticosteroids may lead to slightly higher recovery rates compared with prednisone alone, but findings did not quite reach statistical significance
Quant <i>et al.</i> <sup>67</sup>	2009	Antivirals did not provide an added benefit in achieving at least partial facial muscle recovery compared with steroids alone; hence, study does not support routine use of antivirals. Benefit of antiviral therapy with steroids for patients with severe facial muscle paralysis remains unclear
Thaera <i>et al.</i> <sup>62</sup>	2010	Corticosteroids effectively reduce risk of an unfavourable outcome; antiviral agents, administered with corticosteroids, may result in additional benefit

What is the harm of adding antiviral therapy? Theoretically, antivirals can cause gastroesophageal complaints, renal failure and headache; however, in the studies analysed, the side effects did not differ significantly amongst study groups. Famciclovir is sometimes recommended over acyclovir because of an easier dosage schedule and fewer gastrointestinal side effects.<sup>83</sup>

The effect of non-complete recovery is lifelong morbidity. The price of valaciclovir or Famvir™ to prevent sequelae is about €150.

Thus, the answer to the first question, does antiviral medication combined with steroids improve the recovery of patients with severe palsy, is affirmative. Antivirals should be given to patients with (moderate) severe palsy.

### Decompression surgery

Does decompression surgery ameliorate the outcome in severe cases of Bell's palsy that do not show improvement with medical therapy? The swollen nerve can be given more space with decompression and therefore this treatment fits well with the pathophysiology.<sup>8</sup> The earlier it is done, the less danger there will be of permanent impairment.<sup>21,29,46,84</sup> Theoretically, the only hope of restoring bilaterally co-ordinated emotional expression after paralysis of the facial nerve lies in restoration of the functional integrity of that nerve.<sup>11</sup>

All agree that decompression is not the mainstay of treatment for Bell's palsy. It should be preserved for special cases; it is more relevant in patients who are less likely to recover spontaneously.<sup>8,9,85</sup> Decompression is indicated for a medically treated patient with no signs of recovery of a total paralysis, and ENoG findings showing more than 95 per cent loss of activity, and without voluntary movement potentials on EMG.<sup>8,27,86–88</sup> From reports by McNeill,<sup>7</sup> Gantz *et al.*,<sup>8</sup> Yanagihara *et al.*<sup>89</sup> and Alford *et al.*,<sup>90</sup> it is clear that the timing and extent of decompression are of utmost importance for the recovery and development of sequelae.

Thus, the very nature and duration of the lesion for which decompression is justified make complete recovery unlikely. Yanagihara *et al.*<sup>89</sup> and others have reported an interesting and significant feature: in some patients who have undergone decompression, there is some return of movement within a week of the operation.<sup>9</sup> This is a striking effect, and, as described by Glaziou *et al.*,<sup>91</sup> is strongly suggestive of a genuine treatment consequence.

Tumarkin<sup>41</sup> reported that in the 20 per cent of patients who are not likely to recover spontaneously, the evidence indicates a more central involvement (herpes oticus) extending to the genu. Gantz *et al.*<sup>8</sup> stated correctly that the findings of previous studies evaluating the efficacy of surgical decompression in Bell's palsy that did not include decompression of the nerve medial to the geniculate ganglion (at the narrowest site) should not be generalised to support the notion that surgical decompression is not effective.<sup>50</sup>

If a surgical intervention is established as a useful treatment option based on the good results shown by some surgeons, it does not necessarily mean that any surgeon should perform this treatment. Rather, it means that special cases are better off in special hands.<sup>50</sup> Whereas the effects of treatment with medication are probably generalisable to a certain extent, surgical results are – because of individual skills and the rarity of cases needing surgery – definitely not. Hence, to quote Sir Terence Cawthorne, who, when asked – discussing the vestibulocochlear nerve – to state which datum would most strongly influence his decision whether to proceed to an operation or not, answered: 'the name of the surgeon'.<sup>84</sup>

Decompression surgery is associated with a broad range of possible collateral damage, varying from hearing loss to intracranial complications. Nevertheless, as concluded by Morris<sup>21</sup> (who admittedly performed only transmastoid surgery), 'there is no reason why, if decompression is carried out carefully, there should be any injury to the nerve at all, and the hearing will not be interfered with'. Gantz *et al.*<sup>8</sup> and Yanagihara *et al.*<sup>86</sup> have reported a low incidence of collateral damage, even when more extensive types of surgery were undertaken.

Sinha *et al.*<sup>92</sup> concluded that, of the patients who showed greater than 90 per cent of compound action potential reduction in the affected side, almost half (47 per cent) had normal to near normal recovery, indicating no need for therapy. However, if we reverse our thinking, more than half will end up with sequelae. In addition, other studies have shown no benefit and other authors were sceptical.<sup>93,94</sup>

Reports published in the last five years show good outcomes after decompression surgery in the patient group with a poor prognosis.<sup>95,96</sup>

With regard to question two, does decompression surgery ameliorate the outcome in severe cases that do not show improvement with medical therapy, we conclude that decompression surgery,

TABLE V

#### OUTCOME OF SURGERY VERSUS NO SURGERY IN PATIENTS WITH SEVERE PALSYP OR TOTAL PARALYSIS

Study	Good recovery (n)		Poor recovery (n)	
	Surgery	No surgery	Surgery	No surgery
Fish & Esslen <sup>97</sup>	79%*	64%*	–	–
McNeill <sup>7</sup>	10/19	8/11	9/19	3/11
Giancarlo & Mattucci <sup>27</sup>	12/19	0/8	0/19	6/8
May <i>et al.</i> <sup>98</sup>	5/25	3/13	20/25	10/13
Brown <sup>55</sup>	25/41	24/51	6/41	11/51
Gantz <i>et al.</i> <sup>8</sup>				
– Iowa	18/19	4/11	–	–
– Michigan	7/9	11/27	1/9	4/27
Yanagihara <i>et al.</i> <sup>86</sup>	41/58	26/43	0/58	6/43

\*Numbers not available

performed for the right indication, by the most skilful surgeons, might be effective in preventing sequelae (Table V).<sup>7,8,27,55,86,97,98</sup>

## Conclusion

In view of these results, the probable pathogenesis and, in particular, the severe morbidity of permanent sequelae, antivirals can be crucial. They should be prescribed in combination with steroids in the event of severe deficit and for elderly patients. In cases of complete paralysis with no sign of recovery, and electrophysiological confirmation of a high chance of non-recovery, decompression might be indicated. Patients should be informed about the possibility of this treatment option.

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