CHAPTER 3

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Decision-making in temporal lobe epilepsy surgery: The contribution of basic non-invasive tests.

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Abstract

Purpose. We studied the extent to which widely used diagnostic tests contribute to the decision whether or not to perform temporal lobe epilepsy surgery in the Netherlands.

Methods. This nation-wide, retrospective study included 201 consecutive patients referred for TLE surgery screening. The individual and combined contribution of nine index tests to the consensus decision to perform surgery was investigated. The contribution of each test was quantified using multivariable logistic regression and ROC curves.

Results. Surgery was performed in 119 patients (59%). Patient history and routine EEG findings were hardly contributory to decision-making, whereas a convergence of MRI with long-term interictal and ictal EEG findings correctly identified the candidates considered eligible for surgery (25% of total). Videotaped seizure semiology contributed less to the results. The area under the ROC curve of the combination of basic tests was 0.75. Ineligibility was never accurately predicted with any test combination.

Conclusions. In the Dutch presurgical work-up, when MRI and long-term EEG findings were concordant, a decision for TLE surgery could be reached without further ancillary tests. Videotaped seizure semiology contributed less than expected to the final clinical decision. In our study, basic test findings alone were insufficient to exclude patients from surgery.

Introduction

Temporal lobe epilepsy (TLE) surgery is an established treatment for patients with medically refractory temporal lobe epilepsy.[13;55] Successful epilepsy surgery depends on accurate diagnosis and careful patient selection.[13] The decision-making process or the amount of diagnostic work-up needed to decide whether or not a patient is eligible for TLE surgery, is complex and requires a team of specialists. All epilepsy surgery centers use a phased approach, starting with a similar set of non-invasive, basic tests followed by more invasive and expensive tests.[16] How this leads to a clinical decision whether or not to operate has hardly been studied. For the efficiency of a presurgical work-up it is important, however, to quantify the impact of consecutive tests on decision-making. Recently, guidelines for such diagnostic research have been published (the STARD initiative).[2]

Studies that have been done in TLE surgery usually focused on the value of individual tests, using a univariate approach. However, clearly a clinical decision is not based on a single test.[3;4] Studies that did include combinations of tests usually looked for their prognostic value, i.e. how a good outcome after TLE surgery can be predicted. Therefore, they included only operated patients rather than all patients undergoing the presurgical work-up.[56] Conclusions from prognostic studies are therefore biased and not the best way to study decision-making.

We investigated the extent to which the decision whether or not to perform TLE surgery had been made on the basis of widely used, non-invasive basic tests. We used accumulated data on all Dutch patients in whom epilepsy surgery had been considered.[17] In all patients screened for TLE surgery, we quantified the independent or added value of patient history, routine EEG recordings, MRI, and video-EEG monitoring.

Methods

Patients

This retrospective national study on the decision-making process included all patients referred for evaluation for TLE surgery between July 2000 and July 2002. Patients were excluded when a definite extratemporal seizure origin could already be inferred at referral for presurgical screening. Thus, patients were excluded if the semiology of the seizure onset, according to the patient's history at referral, included a longstanding or evolving somatosensory aura, generalized hypertonia or atonia, in combination with an MRI without temporal lobe abnormalities.

All patients referred for TLE surgery underwent the same presurgical work-up, using a fixed protocol (figure 3.1), starting with a detailed patient history, routine EEG, MRI, and video-EEG monitoring of seizures.[17] If these tests provided inconclusive results, ancillary tests were often performed (e.g., MEG, PET, SPECT, and intracranial EEG monitoring). A national multidisciplinary taskforce determined the final consensus decision, i.e. whether a patient was eligible or ineligible for surgery.

Diagnostic tests under study

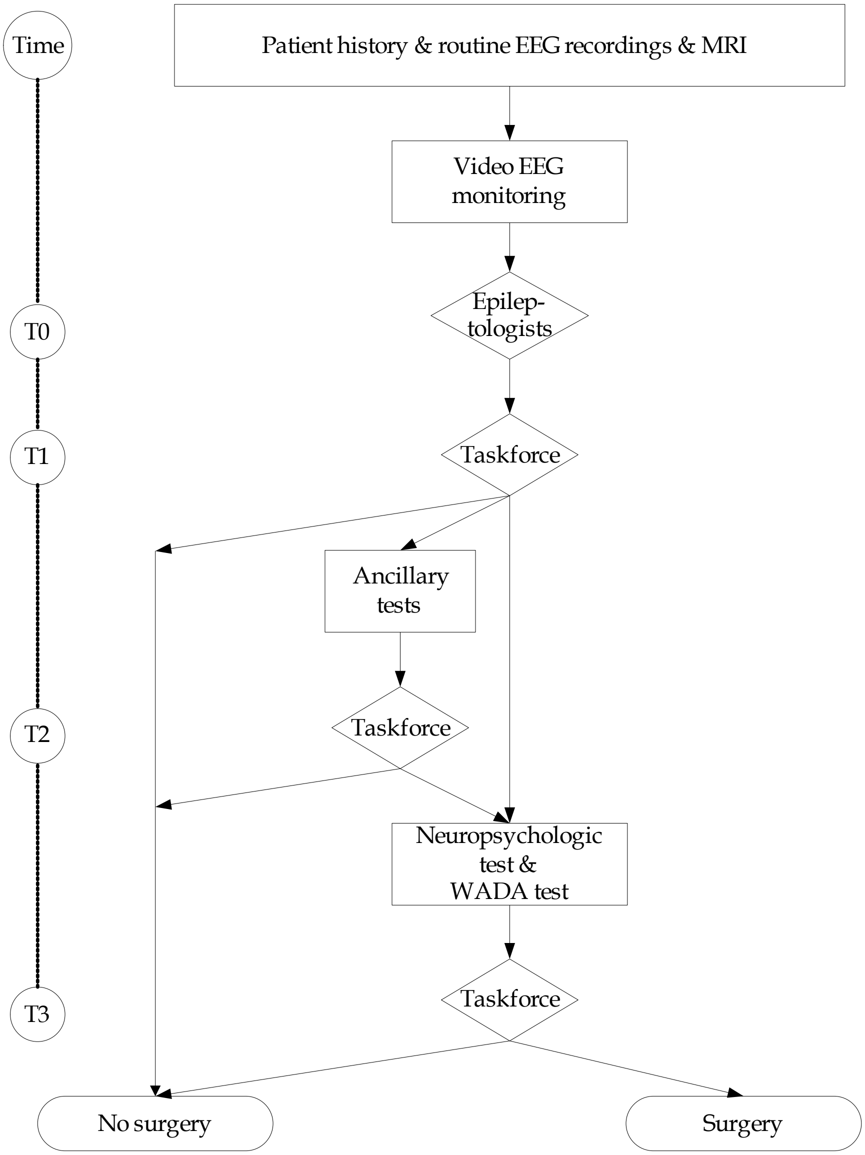
The contribution to the decision-making of the following basic non-invasive tests was evaluated: patient history (four items), routine EEG recordings, MRI, and video-EEG monitoring (three items).

The patient history items we chose were based on literature showing a prognostic value for seizure freedom after surgery. This resulted in the following four items: age at referral, age at onset of non-febrile seizures, previous history of febrile seizures, and temporal (automotor) seizure semiology.[48;57;58] The latter was defined as a seizure duration longer than one minute that included at least four of the following five characteristics: abdominal or experiential aura, impaired consciousness, occurrence of automatisms, unilateral dystonic posturing, or pronounced postictal confusion.[59-61]

The latest representative, routine interictal EEG was evaluated for the presence or absence of unilateral temporal abnormalities, defined as focal epileptiform spikes, sharp waves, or slow waves. When abnormalities were bilateral temporal or both temporal and extratemporal, the test was considered inconclusive.

MRI 1.5T images including coronal FLAIR were evaluated for the presence of unilateral temporal abnormality or not, according to a standardized epilepsy protocol.[62]

Figure 3.1. Patient flow chart



Three aspects of video-EEG monitoring were evaluated: long-term interictal EEG, seizure semiology, and ictal EEG. The long-term interictal EEG was coded as presence or absence of unilateral temporal abnormalities, defined by presence of focal slow waves, epileptiform spikes or sharp waves at electrodes near the tip of the temporal lobe (F7/F8, F9/F10, Sp1/Sp2, T3/T4, or T5/T6). Abnormalities were defined as unilateral when more than 90% of abnormalities occurred unilaterally. Videotaped seizure semiology was coded as the presence or absence of temporal (automotor) semiology,[59-61] as described above (see patient history). Furthermore, lateralization of semiology was defined by using two characteristics described in literature: dysphasia and dystonic posturing.[60] Ictal EEG findings were coded as the presence or absence of a unilateral regional or (delayed) focal temporal seizure onset.[63]

Study outcome

The dichotomous outcome was the consensus decision whether or not to perform TLE surgery, as determined by a national multidisciplinary taskforce consisting of epileptologists, clinical neurophysiologists, neurosurgeons, neuropsychologists and neuroradiologists. Such a consensus decision is necessarily used in situations as in TLE surgery where there is no single or fixed reference available to make the decision.[2;8;11] The taskforce used all available evidence (e.g. also from ancillary tests, neuropsychology, and Wada testing) for determining the indication for surgery.

Data collection

The results of index tests and the consensus decisions were retrospectively retrieved from the patient files and written reports of the taskforce conferences. All information was coded according to the above-described definitions and entered into a research database. To ensure uniform coding of all tests, kappa analyses between the two scoring researchers (S.U., A.C.) and two independent experts (F.L., J.A.) were regularly performed. After preparatory training, kappa values of

0.70 or higher were obtained.

Data analysis

Data were analyzed in three steps. First, the univariate association (including sensitivity, specificity, positive and negative predictive value) of each index test was estimated with regard to the consensus decision for or against surgery. Second, multivariable analysis using logistic regression modeling was used to quantify the extent to which the nine index tests independently contributed to the decision. We started with an overall model including all nine variables, which was reduced by step-wise exclusion of the least contributory tests (p-value over 0.20, based on the log likelihood ratio test) and resulted in a reduced model. To assess the discriminative accuracy of the models, the areas under the receiver operating characteristic curve (ROC area) of the overall and reduced model were compared. Thus, we accounted for the dependency between the models as they were estimated on the same subjects.[64] Finally, cross-tabulations were calculated for the combinations of test results from the reduced model with the consensus decision. Tests were considered concordant when both showed unilateral temporal abnormalities on the same side. Tests were considered discordant when they showed unilateral temporal abnormalities on opposite sides.

Some values were missing. Age at onset of seizures was missing in 1% of the patients and occurrence of febrile seizures in 38%. The latter percentage was relatively high but realistic because we coded febrile seizures as unknown when patients themselves or their relatives were not certain whether they had occurred. Reports on routine EEG recordings were missing in 19% of the patients. Since missing values usually do not occur at random, we imputed the missing values of MRI and video-EEG monitoring, using single imputation by linear regression with the addition of a random error term.[65-67]

All statistical analyses were performed with SPSS version 11.5 (Chicago, IL, USA).

Results

During the 2-year inclusion period, 201 patients were referred for presurgical work-up for TLE surgery in the Netherlands. Table 3.1 shows the nine index tests and the consensus decision. Of the 201 analyzed patients, 119 (59%) were considered eligible for TLE surgery. One year after surgery, 72% of these patients were seizure free (Engel score 1A). Of the 201 patients, 82 (41%) were ineligible for TLE surgery. Reasons for ineligibility were multifocal epilepsy in 28 patients, 9 had an unclear focus localization, 9 concomitant diseases, and 3 had an inoperable focus. Furthermore, 8 patients dropped out because they became seizure free during presurgical screening, 13 declined to undergo invasive EEG, one patient died, and 4 dropped out for other reasons. Seven patients were considered eligible for extratemporal and not temporal surgery (in our study, they are classified as not undergoing TLE surgery). Seven other patients were considered eligible for TLE surgery, but renounced surgery on second thoughts.

Besides the basic non-invasive tests, 53 patients underwent a PET; 31 of whom underwent surgery. Ten patients also underwent intracranial EEG monitoring; 9 of whom consecutively underwent surgery. Neuropsychological assessment was performed in 134 patients and a Wada test in 116 patients. Figure 3.2 shows the patient flow from MRI results to ictal EEG results. The results of interictal EEG and seizure semiology are also included.

None of the four patient history items was significantly associated with the decision for or against surgery (all p-values over 0.50). The other basic tests were all significantly associated with the decision, but showed a large variation in sensitivity, specificity, and predictive values (table 3.2). MRI had the highest sensitivity and negative predictive value, whereas long-term ictal EEG showed the highest specificity and positive predictive value, followed by long-term interictal EEG.

Table 3.1. Distribution of investigated diagnostic tests and the decision for or against surgery (N=201)

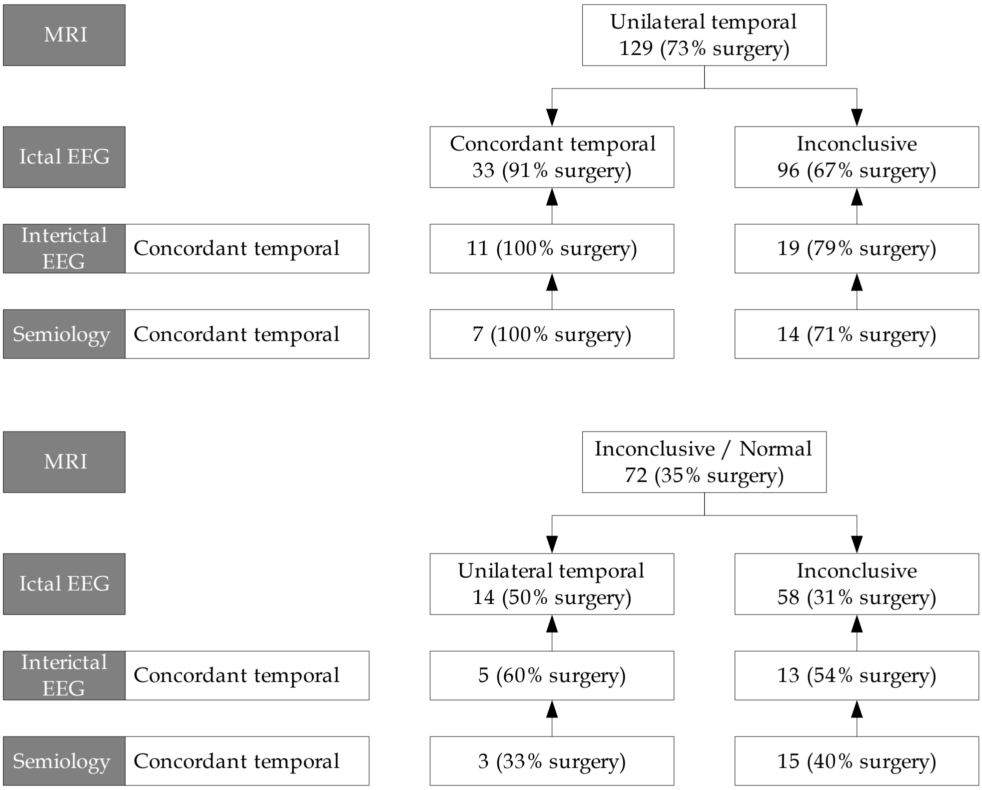
Patient history		
	Age at referral for surgery (median (range))	32.5 (1 - 62)
	Age at onset epilepsy (median (range))	12.0 (0 - 47)
	Febrile seizures	75 (37)
	Temporal seizure semiology	131 (65)
Routine EEG recordings		
	Unilateral temporal	72 (36)
	Normal	5 (2)
	Inconclusive[a]	124 (62)
MRI		
	Unilateral temporal	129 (64)
	Normal	24 (12)
	Inconclusive[a]	48 (24)
Video-EEG monitoring		
	Long-term interictal EEG	
	Unilateral temporal	51 (25)
	Inconclusive[a]	150 (75)
	Seizure semiology	
	Definitely temporal	71 (35)
	Not localising	130 (65)
	Ictal EEG	
	Unilateral temporal	47 (23)
	Inconclusive[a]	154 (77)
Study outcome: considered eligible for surgery		119 (59)

Values represent number of patients (percentage) unless mentioned otherwise;
[a] Inconclusive = not localizing to one temporal lobe

Table 3.2. Crosstables and association of the tests under study with the decision for or against surgery, estimated by the accuracy parameters with 95% confidence intervals

	Decision for surgery			*Sensitivity*	*Specificity*	*Positive predictive value*	*Negative predictive value*
	Yes (N=119)	***No*** (N=82)	*p-value*				
Routine EEG			0.02				
Unilateral temporal	50	22		0.42	0.73	0.69	0.47
Inconclusive / normal	69	60		(0.34-0.51)	(0.63-0.82)	(0.58-0.79)	(0.38-0.55)
MRI			0.00				
Unilateral temporal	94	35		0.79	0.57	0.73	0.65
Inconclusive / normal	25	47		(0.71-0.85)	(0.47-0.67)	(0.65-0.80)	(0.54-0.75)
Long-term interictal EEG			0.02				
Unilateral temporal	37	14		0.31	0.83	0.73	0.45
Inconclusive	82	68		(0.23-0.40)	(0.73-0.90)	(0.59-0.83)	(0.38-0.53)
Videotaped semiology			0.03				
Definitely temporal	49	22		0.41	0.73	0.69	0.46
Not localising	70	60		(0.32-0.50)	(0.63-0.82)	(0.58-0.79)	(0.38-0.55)
Ictal EEG			0.00				
Unilateral temporal	37	10		0.31	0.89	0.79	0.47
Inconclusive	82	72		(0.23-0.40)	(0.79-0.93)	(0.65-0.88)	(0.39-0.55)

Figure 3.2. Patient flow chart and surgery percentages



The overall multivariate model including the nine index tests yielded a ROC area of 0.76 (table 3.3). Excluding variables with a p-value over 0.20 resulted in a model based on routine EEG, MRI, and the three video-EEG monitoring items. The ROC area of this reduced model also was 0.76 (95% confidence interval, 95%CI: 0.69-0.83). In this reduced model, MRI and ictal EEG contributed most to decision-making and routine EEG, seizure semiology, and long-term interictal EEG least. As ictal EEG is always obtained in combination with interictal EEG and seizure semiology during video-EEG monitoring, whereas routine EEG is a separate diagnostic test, we also removed routine EEG findings from the reduced model, resulting in the final reduced model with a ROC area of 0.75 (table 3.3), which was not significantly lower than the overall model (p-value: 0.47).

Table 3.3. Results of the multivariable logistic regression analysis for the overall and reduced model predicting the decision for or against surgery

		Overall model			*Reduced model*	
Determinant	*Odds Ratio*	*95% CI*	*p-value*	*Odds Ratio*	*95% CI*	*p-value*
Age at referral	1.00	0.97-1.03	0.80			
Age at onset epilepsy	1.00	0.96-1.03	0.86			
Febrile seizures	0.81	0.41-1.62	0.55			
Temporal semiology	1.11	0.55-2.24	0.77			
Routine EEG	1.52	0.76-3.06	0.24			
MRI	5.20	2.62-10.34	<0.01	5.14	2.66-9.94	<0.01
Long-term interictal EEG	2.22	0.98-4.99	0.06	2.11	0.67-4.62	0.06
Videotaped semiology	1.38	0.68-2.79	0.38	1.36	0.69-2.68	0.38
Ictal EEG	3.08	1.32-7.20	<0.01	3.06	1.33-7.02	<0.01
ROC area (95% CI)	0.76	0.69-0.83		0.75	0.69-0.82	0.47[a]

95% CI = 95% confidence interval; [a] p-value of the difference in ROC area between the reduced and the overall model

Table 3.4 shows the correlation between combinations of MRI and video-EEG monitoring results and the decision to operate. The first row of each of the combinations can be considered as a positive test result, therefore representing the positive predictive value of the test combination; the last row can be considered as the negative predictive value. In isolation, MRI had a positive predictive value of 0.73 (table 3.2) and in combination with concordant seizure semiology 0.72 (table 3.4). Concordant long-term interictal EEG findings as well as concordant ictal findings improved the positive predictive value of MRI to 0.87 and 0.91, respectively (table 3.4). The negative predictive value of MRI remained the same when MRI was combined with the three video-EEG monitoring items (0.65, table 3.2).

Concordant lateralizing and localizing findings for MRI and ictal EEG (N=33) led to a decision to perform surgery, except in three patients with inconclusive long-term interictal EEG results (table 3.4). Concordant findings on MRI, long-term interictal EEG, and ictal EEG always led to a decision to operate and correctly identified 30 out of 119 (25%) eligible candidates. In this group, 79% had Engel class 1A one year after surgery. Eight of these 30 patients underwent a PET scan, and one also underwent intracranial EEG monitoring.

For patients in whom MRI and long-term EEG were not completely concordant (75% of operated patients), the decision for surgery was usually based on the different combinations of results from MRI, interictal EEG, semiology, and ictal EEG (figure 3.2), or on the results of ancillary tests, when performed. The three video monitoring index tests yielded inconclusive results in a large number of patients. Of all 129 patients with unilateral temporal abnormalities on MRI (table 3.4), 96 had inconclusive interictal EEG findings, 67 (70%) of whom were considered eligible for surgery. Similarly, 74 of 101 (74%) patients with inconclusive seizure semiology and 64 of 96 (67%) patients with inconclusive ictal EEG findings (table 3.4) were eligible for surgery. Truly discordant findings on MRI and video-EEG were found in only 6 patients (table 3.4), of whom 3 were considered eligible for surgery after ancillary testing. The operated patient with discordant MRI and long-term interictal EEG had an Engel score 2A one year after surgery; the operated patients with discordant MRI and seizure semiology both had Engel score 1A one year after surgery. Thus, no combination of basic tests could reliably identify patients ineligible for surgery.

Table 3.4. MRI in combination with video monitoring in relation to the decision for or against surgery

	Video-EEG monitoring	*Decision for surgery*		*Number of subjects*
MRI	***Interictal EEG***	Yes (fraction)	No (fraction)	
Unilateral temporal	Concordant [a]	26 (0.87) [b]	4 (0.13)	*30*
Unilateral temporal	Inconclusive	67 (0.70)	29 (0.30)	*96*
Unilateral temporal	Discordant	1 (0.33)	2 (0.67)	*3*
Inconclusive / normal	Unilateral temporal	10 (0.56)	8 (0.44)	*18*
Inconclusive / normal	Inconclusive	15 (0.28)	39 (0.72) [c]	*54*
MRI	***Seizure semiology***			
Unilateral temporal	Concordant [a]	18 (0.72) [b]	7 (0.28)	*25*
Unilateral temporal	Inconclusive	74 (0.74)	27 (0.27)	*101*
Unilateral temporal	Discordant	2 (0.67)	1 (0.33)	*3*
Inconclusive / normal	Unilateral temporal	2 (0.67)	1 (0.33)	*3*
Inconclusive / normal	Inconclusive	23 (0.33)	46 (0.67) [c]	*69*
MRI	***Ictal EEG***			
Unilateral temporal	Concordant [a]	30 (0.91) [b]	3 (0.09)	*33*
Unilateral temporal	Inconclusive	64 (0.67)	32 (0.33)	*96*
Inconclusive / normal	Unilateral temporal	7 (0.50)	7 (0.50)	*14*
Inconclusive / normal	Inconclusive	18 (0.31)	40 (0.69) [c]	*58*

[a]Concordant unilateral temporal; [b] Positive predictive value of combination of tests; [c] Negative predictive value of combination of test

Since temporal seizure semiology from video contributed only marginally to the decision, we also assessed whether more refined items from videotaped seizure semiology (table 3.5) did have an impact that we might have missed by reducing the diagnostic test conclusion to temporal seizure semiology, yes or no. Only impaired consciousness and pronounced postictal confusion were significantly associated with the final decision (both p-value 0.01), but all items had positive and negative predictive values that were lower than the positive and negative predictive value of overall temporal seizure semiology as we defined it.

Table 3.5. Coded items for videotaped seizure semiology

Item	***Answer possibilities***
Type of aura	No aura
	Abdominal
	Autonomic
	Sensory
	Somatosensory
	Experiential
Classification of seizure beginning	Restricted to aura
	Autonomic
	Dialeptic / hypomotor
	Tonic
	Tonic-clonic
	Versive
	Hypermotor
	Automotor
	Atonic / astatic
	Aphasic

Table 3.5. Continued

Item	*Answer possibilities*
Classification of seizure course	No change
	Autonomic
	Dialeptic / hypomotor
	Tonic
	Tonic-clonic
	Versive
	Hypermotor
	Automotor
	Atonic / astatic
	Aphasic
Impaired consciousness	No / Yes
Orofacial automatisms	No / Yes
Automatisms of fingers / hands	No / Yes (including side)
Eye blinking	No / Yes
Motor agitation	No / Yes
Version of eyes or head to one side	No / Yes (including side)
Speech	No
	Adequate spontaneous speech
	Unintelligible speech
	Delirious
	Mutism
	Aphasia / dysphasia
	Vocalisations
Arm dystonia	No / Yes (including side)
Clonic contractions	No / Yes (including side)
Problems with naming or understanding	No / Yes
Postictal symptoms	No
	Paresis (including side)
	Agression / psychosis
	Vomiting
	Pronounced confusion

Discussion

Clinical implications

The combination of basic, non-invasive tests we studied had a moderate overall influence on clinical decision-making for patients referred for TLE surgery screening in the Netherlands. This perhaps emphasizes the importance of ancillary tests that were performed but not included in our study. As individual tests, basic tests were slightly more suitable for including rather than excluding patients for epilepsy surgery, since the positive predictive value of routine EEG, MRI and video-EEG was higher than their negative predictive value. This is consistent with our finding that discordant results are not always indicative of ineligibility for TLE surgery.

In our study population, there was a group of patients in whom the decision for surgery could be made without performing further ancillary tests, viz. patients with unilateral temporal MRI abnormalities with concordant findings on both long-term interictal and ictal EEG during monitoring. This represents 25% of patients who were considered eligible for surgery. This is a remarkable finding, because we used a rather crude coding of test results that ignores many nuances that actually led to long discussions in some cases with a request for ancillary tests that in retrospect did not contribute to decision-making. Also, the four patient history items, the routine EEG findings, and videotaped seizure semiology hardly contributed to the decision whether to operate. Again, we have the experience that aspects of patient history or subtle findings in seizure semiology may lead to insecurity about the diagnosis, and thus to further testing. The Dutch taskforce is especially keen on close analysis of videotaped seizure semiology, so its relatively low contribution to the decision-making came as a disappointment. This finding needs confirmation from other centers. In a recent review, So also addressed limitations of the localizing value of videotaped seizure semiology.[68] Serles *et al.* did find a contribution of videotaped seizure semiology,[69] but they did not analyze the value of seizure semiology with regard to other diagnostic tests, such as MRI. Although patient history and routine EEG in our study contributed only marginally to the decision-making process, it should be noted that these tests were necessary to refer these patients as possible candidates for TLE surgery. Earlier studies show the high specificity with which this can be done with regard to TLE diagnosis.[70] Our retrospective study included only patients after referral.

There are few comparable studies of the decision-making process for epilepsy surgery.[56] Two studies assessed the value of a combination of two diagnostic tests in the presurgical work-up. Berg *et al.* found the highest proportion of patients eligible for surgery with concordant overall MRI and video-EEG results.[52] DellaBadia *et al.* assessed the contribution of the combination of sleep-deprived EEG and MRI.[36] Their results were also consistent with ours, except that we found lower negative predictive values for routine or sleep-deprived EEG, either alone or in combination with MRI. This may be because DellaBadia *et al.* used a stricter protocol for performing sleep-deprived EEG and investigated fewer patients (69 versus 201 patients).

Prognostic studies have shown that concordant MRI, interictal EEG and ictal EEG successfully select candidates for surgery, based on the prognostic value of these tests, i.e. outcome after surgery.[24;71] In our study population, we confirm that the same diagnostic tests can select possible candidates for surgery, with the difference that in our study also patients that were eventually rejected for surgery were included. It is important that these results are complementary because they could form the basis for more worldwide consensus on the use of ancillary tests, e.g. invasive studies. Of course, apart from setting the indication for epilepsy surgery, surgical strategy also plays a role. Some centers will order ancillary tests for performing a specialized kind of resection, e.g. selective amygdalohippocampectomy, which will usually involve some invasive testing for sublobar focus localization. The issue of surgical strategy is not settled and many practices abound. Even given this disparity, we think that our data hold for these different practices when it comes to setting the principle decision whether to perform surgery or not. Our results therefore endorse further thinking about the use of ancillary tests in some cases, especially when standard or intraoperatively tailored resections are considered. This could make epilepsy surgery programs more cost effective.

Methodological aspects

Some methodological aspects limit extrapolation of our results and need to be discussed. Unfortunately, there is no single reference test to set the decision for surgery. In the absence of a single established reference, we used the consensus judgment of a group of experts to set the decision for TLE surgery, based on all available information. This is considered the best alternative when a reference test is lacking,[2;8;11] but our results should be interpreted with care. A potential disadvantage of this reference method is the possibility of incorporation bias, because the reference is not independent from the index tests under study.[8;9;20] The effect of the incorporation bias, however, can be judged afterwards as it commonly leads to overestimation of the contribution of the index tests. The independent contribution of MRI and video-EEG in our study was so substantial that it is unlikely that this could solely be attributed to incorporation bias.

We believe that the consensus decision of the taskforce was adequate. The overall outcome of surgery in our series was comparable to or higher than values reported in the literature, with 72% of patients being seizure free (Engel score 1A) one year after TLE surgery.[13;14] All patients underwent tailored temporal resections. Long-term follow-up of these patients showed that such surgery did not harm cognitive performance and had only a limited adverse effect on intellectual function.[72;73] Nevertheless, the problem remains that we do not know how many patients were inappropriately rejected for surgery. Patients who have been denied surgery in our program, might have been found eligible at other centers. This objection could have been met by including specialists from other countries in the consensus panel. Even then, there is no definite way to settle this, because the decision for surgery cannot be randomized.

Since our reference test was a final consensus decision including all diagnostic information, we used a backward statistical approach, starting with inclusion of all index tests. Assessment of the added value of a stepwise decision-making process should mirror clinical practice, starting with the patient history, followed by estimation of the added value of each consecutive test.[3;4] For comparison, we also applied this more commonly used forward approach, which yielded the same results.

The results of the index tests were reduced to a few clinically applicable and widely used essentials. These essentials obviously do not comprise all diagnostic information conveyed by the tests, and some complexities could have been obscured. Considerations of reproducibility and proof of evidence from the literature played a major role in the choice of items to study. Seizure semiology and MRI were used both as a diagnostic test under study and as an exclusion criterion, since we wanted to confine the study to patients screened for temporal lobe surgery, i.e. patients who do not have unequivocal extratemporal epilepsy. Including extratemporal cases would undoubtedly have improved the negative predictive value of the index tests.

Routine EEG was performed in different centers (local hospitals, university hospitals, or epilepsy clinics) and according to different protocols (sleep-deprived or not, duration of 30 to 90 minutes). Because we wanted to reproduce daily clinical practice, we accepted these differences. For this reason, it is not surprising that routine EEG was not included in the final model whereas long-term interictal EEG was.

Neuropsychological test results were not included as a basic test. They are not used for focus localization purposes in The Netherlands, but mainly for assessment and prediction of cognitive change in those in whom a decision for surgery has been reached. Although this standpoint is well supported,[74] other epilepsy surgery centers would use these test results for localization and thus include them in the basic test battery of all referred patients. The prognostic importance of neuropsychological test results is beyond doubt, however, as far as we know, there are no data on their contribution to the decision-making process in such a setting.[56]

Conclusions

In this retrospective study from the Dutch population, concordance between MRI, long-term interictal and ictal EEG findings was sufficient to identify a group (25%) of patients eligible for TLE surgery. This suggests that a decision for surgery in these cases could have been reached without further tests. After referral for presumed TLE, analysis of videotaped seizure semiology seemed to have less impact than expected on the final clinical decision. In the Dutch program, patients could not be excluded from TLE surgery based on results of basic tests only.