

HEAD AND NECK

# Italian cross-cultural adaptation and validation of three different scales for the evaluation of shoulder pain and dysfunction after neck dissection: University of California - Los Angeles (UCLA) Shoulder Scale, Shoulder Pain and Disability Index (SPADI) and Simple Shoulder Test (SST)

*Adattamento culturale e validazione di tre scale per la valutazione del dolore e della disfunzione della spalla dopo svuotamento linfonodale laterocervicale: Università della California - Los Angeles (UCLA) Scala per la Spalla, Indice di Dolore e Disabilità della Spalla (SPADI) e Test Semplice della Spalla (SST)*

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## SUMMARY

Shoulder syndrome after neck dissection is a well known entity, but its incidence and prognostic factors influencing recovery have not been clearly assessed due to the heterogeneity of possible evaluations. The University of California - Los Angeles (UCLA) Shoulder Scale, the Shoulder Pain and Disability Index (SPADI) and the Simple Shoulder Test (SST) are three English-language questionnaires commonly used to test shoulder impairment. An Italian version of these scales is not available. The aim of the present study was to translate, culturally adapt and validate an Italian version of UCLA Shoulder Scale, SPADI and SST. Translation and cross-cultural adaptation of the SPADI, the UCLA shoulder scale and the SST was performed according to the international guidelines. Sixty-six patients treated with neck dissection for head and neck cancer were called to draw up these scales. Forty patients completed the same questionnaires a second time one week after the first to test the reproducibility of the Italian versions. All the English-speaking Italian patients (n = 11) were asked to complete both the English and the Italian versions of the three questionnaires to validate the scales. No major problems regarding the content or the language were found during the translation of the 3 questionnaires. For all three scales, Cronbach's  $\alpha$  was  $> 0.89$ . The Pearson correlation coefficient was  $r > 0.91$ . With respect to validity, there was a significant correlation between the Italian and the English versions of all three scales. This study shows that the Italian versions of UCLA Shoulder Scale, SPADI and SST are valid instruments for the evaluation of shoulder dysfunction after neck dissection in Italian patients.

KEY WORDS: UCLA • SPADI • SST • Shoulder • Neck dissection

## RIASSUNTO

*La sindrome della spalla dopo svuotamento linfonodale del collo è un evento noto ma la sua reale incidenza ed i fattori prognostici che influenzano il recupero della funzione dell'arto superiore non sono stati chiariti probabilmente a causa della eterogeneità degli strumenti d'indagine disponibili. La Scala per la spalla dell'Università della California - Los Angeles (UCLA), l'Indice del Dolore e della disabilità della Spalla (SPADI) ed il Test Semplice della Spalla (SST) sono tre questionari in lingua inglese frequentemente utilizzati per valutare la disfunzione della spalla. Una versione in lingua italiana di queste scale non è disponibile. Scopo di questo studio è tradurre, adattare alla cultura italiana e validare una versione italiana della Scala della Spalla UCLA, di SPADI e di SST. La traduzione e l'adattamento culturale sono stati eseguiti secondo le linee guida internazionali. Sessantasei pazienti sottoposti a svuotamento linfonodale del collo sono stati selezionati per completare la versione italiana dei questionari. Quarantuno pazienti hanno completato gli stessi questionari una seconda volta una settimana dopo per testare la riproducibilità delle versioni italiane. Gli 11 pazienti in grado di comprendere la lingua inglese hanno completato sia la versione in inglese che quella in italiano dei tre questionari. Nessun problema importante riguardo il contenuto ed il linguaggio è stato evidenziato durante la traduzione dei 3 questionari. Per le 3 scale esaminate il Cronbach  $\alpha$  è risultato  $> 0,89$ . Il coefficiente di correlazione di Pearson è risultato  $r > 0,91$ . Inoltre una significativa correlazione tra la versione in inglese e quella in italiano è stata rilevata per i 3 questionari. Questo studio mostra che le versioni in italiano della Scala della Spalla UCLA, di SPADI e di SST sono strumenti validi per la valutazione della disfunzione della spalla dopo svuotamento linfonodale del collo nei pazienti italiani.*

PAROLE CHIAVE: UCLA • SPADI • SST • Spalla • Svuotamento linfonodale laterocervicale

**Table I.** Demographic, clinical, histological characteristics and treatment of patients. cT: clinical tumour stage; cN: clinical pathological stage; SND: selective neck dissection; ND: neck dissection.

Variable	n/range	%/mean
Age, years	17-82	59
Gender		
Male	39	59.1
Female	27	40.9
Primary tumour site		
Oral cavity	25	37.9
Oro- hypopharynx	9	13.6
Larynx	16	24.3
Thyroid	8	12.1
Facial skin	3	4.5
Unknown primary T	5	7.6
Histology		
Squamous cell carcinoma	55	83.3
Skin melanoma	3	4.6
Thyroid differentiated tumour	8	12.1
cT		
X	5	7.6
1	15	22.7
2	17	25.8
3	13	19.7
4a	16	24.2
cN		
N-	34	51.5
N+	32	48.5
Type of neck dissection		
Selective ND	37	56.1
Modified radical ND	23	34.8
Radical ND	6	9.1
Adjuvant postoperative radiation therapy		
Yes	25	37.9
No	41	62.1
Total of patients	66	100

## Introduction

In 1952, Ewing and Martin<sup>1</sup> first described the damage of spinal accessory nerve (SAN) during radical neck dissection (ND) and subsequent shoulder dysfunction. In 1961, Nahum and Marmor<sup>2</sup> described the so-called "shoulder syndrome", consisting of shoulder pain, limitation of shoulder abduction and winging of the scapula, resulting from the damage of SAN during radical ND.

At present, shoulder syndrome is recognized as an important postoperative factor that affects the quality of life in patients undergoing ND. The clinical evaluation of should-

er syndrome is not simple and in past years has been performed with several subjective scales<sup>3-8</sup> and objective clinical and electrophysiologic measures<sup>3,9-11</sup>. Despite this, the actual incidence of long-term shoulder disability after ND, the prognostic factors for shoulder recovery and the efficacy of physiotherapy have not been completely clarified<sup>12</sup>. The University of California - Los Angeles (UCLA) Shoulder Scale<sup>13</sup>, the Shoulder Pain and Disability Index (SPADI)<sup>14</sup> and the Simple Shoulder Test (SST)<sup>15</sup> are three English-language questionnaires commonly used to assess shoulder impairment. These scales have already been validated<sup>16,17</sup>, but an Italian version is not available. The aim of this retrospective study was to translate, culturally adapt and validate an Italian version of these three questionnaires to provide a subjective method for the evaluation of shoulder impairment after ND for Italian patients.

## Materials and methods

### Patients

We collected data of all patients treated with ND for any head and neck cancer in the period 1 January 2009-31 December 2009 at the Department of Otolaryngology-Head and Neck Surgery of National Cancer Institute "Regina Elena" in Rome such that all treatments had been performed at least 12 months prior to the present study. We telephoned all 142 patients, of which 99 patients were reached. The remaining 43 patients had either died or were not traceable. By phone, the 99 patients were asked to complete the three questionnaires, immediately sent by post or e-mail, and to return them to our ENT Department by post or e-mail. Sixty-six patients, 39 males and 27 females, completed the procedure and returned the questionnaires. Demographics, clinical and histological characteristics and type of treatment are reported in Table I.

The surgical treatment on the neck was: selective ND<sup>18</sup> in 37 cases, modified radical ND (levels I to V with respect of internal jugular vein, SAN and sternocleidomastoid muscle)<sup>18</sup> in 23 cases and radical ND (level I to V with sacrifice of internal jugular vein, SAN and sternocleidomastoid muscle) in 6 cases.

All 66 patients were asked to complete the questionnaires a second time one week after the first to assess reproducibility, and 40 patients returned the second copy of the questionnaires. Moreover, all the English-speaking Italian patients (n = 11) were asked to complete both the English and the Italian versions of the three questionnaires to validate the scales.

### Translation and cross-cultural adaptation

The questionnaires included were: the University of California - Los Angeles (UCLA) Shoulder Scale<sup>13</sup>, the Shoulder Pain and Disability Index (SPADI)<sup>14</sup> and the Simple Shoulder Test (SST)<sup>15</sup>.

All these questionnaires have already been validated<sup>16,17</sup>. The UCLA scale consists of two questions dealing with pain and function, each with six possible answers scored 1 to 10, with higher score indicating greater function and no pain.

The SPADI comprises a series of 13 items (five for pain, eight for function), each scored with a visual analogue scale ranging from 0 (no pain/no difficult) to 100 (worse pain imaginable/so difficult that required help). The final score can range from 0 (worst) to 100 (best) points.

The SST consists of 12 questions about physical function with dichotomous (yes or no) response options. The scores range from 0 (worst) to 100 (best) and are reported as the percentage of items that a person answers in the affirmative.

Cross-cultural adaptation of the UCLA Shoulder Scale, the SPADI and the SST was performed following the guidelines reported in literature<sup>19</sup>. Three bilingual native Italian speakers independently translated the questionnaires into Italian (forward translation phase). Successfully, a consensus was reached on a first preliminary Italian version based on the 3 translations. Next, 2 bilingual native English speakers retranslated the Italian version into English (back translation phase). Any inconsistency was resolved.

### Statistics

The statistical analysis was performed using SPSS version 18.0. Values of  $p < 0.05$  were considered significant. Internal consistency was tested using the Cronbach's coefficient  $\alpha$ . Reproducibility, or test-retest reliability, was assessed using the questionnaires of the 40 patients who completed a second copy of the scales 7 days after the first. Correlation between the total results of the three tests was determined using the Pearson correlation coefficient. Validity was assessed by calculating the Pearson correlation coefficient between the Italian and the English versions of each scale for the 11 patients who completed the questionnaires in both languages.

## Results

The final Italian versions of the 3 scales are shown in Tables II, III, IV. The original English versions are available online<sup>16</sup>. The translation of UCLA did not cause any major problems. A numeric score was given to each answer: A = 1, B = 2, C = 4, D = 6, E = 8, F = 10. Little discrepancy was found concerning the expression "strong medicine" to mean painkiller drugs. We think that this expression is not clear and we translated it as "analgesici potenti".

Translation of SPADI did not reveal any major problem and no discrepancy was found. Conversion of units of

**Table II.** Italian version of UCLA Shoulder Scale. A numeric score is given to each answer: A = 1, B = 2, C = 4, D = 6, E = 8, F = 10.

### UCLA Scala Dolore

Barri la risposta che meglio descrive la Sua situazione:

- A Dolore sempre presente, insopportabile. Frequente utilizzo di analgesici potenti.
- B Dolore sempre presente ma sopportabile. Occasionale utilizzo di analgesici potenti.
- C Dolore assente o lieve a riposo, presente durante attività leggere. Frequente utilizzo di analgesici.
- D Dolore presente solo durante attività pesanti e/o attività particolari. Occasionale utilizzo di FANS.
- E Dolore occasionale e lieve.
- F Nessun dolore.

### UCLA Scala Funzione

Barri la risposta che meglio descrive la Sua situazione:

- A Non mi è possibile utilizzare il braccio.
- B Riesco ad eseguire unicamente attività leggere.
- C Riesco ad effettuare le faccende domestiche leggere oppure la maggior parte delle attività giornaliere.
- D Riesco ad eseguire la maggior parte delle faccende domestiche, guidare l'auto, fare shopping, pettinarmi, vestirmi e svestirmi (compreso allacciare il reggiseno).
- E Solo modesta restrizione della mia attività. Riesco ad utilizzare le braccia al di sopra del livello della spalle.
- F Attività normale.

measure (pound (lb)/kilogram (kg)) was necessary. Even if 10 lb is 4.5 kg (1 lb = 0.45 kg) we converted 10 lb in 5 kg in order to simplify question number 7.

Translation and cross-cultural adaptation of SST was more complicated. Conversion of units of measure (lb/kg and yard/metre (m)) was necessary. One pound was converted in 0.5 kg. To simplify questions 7 and 8, eight lb was considered 3.5 kg and 20 lb to 9 kg, instead of 3.6 and 9.1 kg, respectively.

One metre is 1094 yards. Ten and 20 yards were converted to 9.14 and 18.29 m and approximated to 9 and 18 m, respectively.

Another problem was due to the softball in question number 9. In Italy, softball is largely unknown and people are therefore not familiar with the ball. It was necessary to change softball to tennis ball, even if this is much lighter.

Internal consistency was high and for all the three scales Cronbach's  $\alpha$  was  $> 0.89$ ; all items correlated with the total score with  $r$  always  $> 0.54$ . A total of 40 patients completed the questionnaire twice to test the reproducibility. The Pearson correlation coefficient was  $r > 0.91$  for all three scales.

A total of 11 patients completed both the Italian and the English version of the three scales and a significant correlation was found in all cases ( $r > 0.89$ ,  $p < 0.05$ ).

**Table III.** Italian version of SPADI Scale.**Indice del dolore e della disabilità della spalla (SPADI)**

Parte I: Per ogni domanda metta un segno lungo la linea per indicare quanto dolore ha provato durante la scorsa settimana.

1. Nel momento di peggior dolore?  
Nessun dolore -----Peggior dolore immaginabile
2. Quando è disteso sul lato operato?  
Nessun dolore -----Peggior dolore immaginabile
3. Quando prova a raggiungere qualcosa su uno scaffale alto?  
Nessun dolore -----Peggior dolore immaginabile
4. Quando si tocca la nuca?  
Nessun dolore -----Peggior dolore immaginabile
5. Quando spinge con il braccio interessato?  
Nessun dolore -----Peggior dolore immaginabile

Parte II: Per ogni domanda metta un segno lungo la linea per indicare quanta difficoltà ha avuto nello svolgere le attività riportate nell'ultima settimana.

1. Lavarsi i capelli?  
Nessuna difficoltà-----Talmente difficile da richiedere un aiuto
2. Lavarsi la schiena?  
Nessuna difficoltà -----Talmente difficile da richiedere un aiuto
3. Indossare una maglietta oppure un pullover?  
Nessuna difficoltà -----Talmente difficile da richiedere un aiuto
4. Indossare una camicia abbottonata sul davanti?  
Nessuna difficoltà -----Talmente difficile da richiedere un aiuto
5. Indossare i pantaloni?  
Nessuna difficoltà-----Talmente difficile da richiedere un aiuto
6. Mettere un oggetto su uno scaffale alto?  
Nessuna difficoltà -----Talmente difficile da richiedere un aiuto
7. Portare un oggetto del peso uguale o superiore a 5 kg?  
Nessuna difficoltà-----Talmente difficile da richiedere un aiuto
8. Prendere qualcosa dalla tasca posteriore dei pantaloni?  
Nessuna difficoltà -----Talmente difficile da richiedere un aiuto

**Discussion**

ND is a frequent surgical procedure in head and neck cancer. Different types of ND have been described and the choice of a more aggressive or a more conservative ND is generally based on the characteristics of the tumour, the presence of clinical nodal metastases and the possibility of postoperative shoulder syndrome. Shoulder syndrome consists of shoulder pain, limitation of shoulder abduction and winging of the scapula<sup>2</sup>, and results from the damage of SAN during radical ND. Shoulder syndrome is recognized as an important factor that affects the postoperative quality of life in patients undergoing ND.

The reported incidence of shoulder syndrome is variable, ranging from 10 to 65%. Shoulder impairment shows a dramatic increase at 6 months after surgery with very slight improvement over time<sup>4</sup>. More extensive and aggressive surgery is associated with higher postoperative shoulder morbidity<sup>8,20</sup>; the incidence of shoulder dysfunction

is lower, 30-40% of cases, when the SAN is preserved and higher, 60% of cases, when a classic radical ND<sup>3, 21-24</sup> is performed. Furthermore, cervical plexus injury also contributes to the genesis of shoulder syndrome<sup>3</sup>. Shoulder dysfunction is worse when the dissection is extended to level V<sup>9, 10, 18, 23</sup>. The sacrifice of sternocleidomastoid muscle and SAN has been associated with difficulties in leisure-related, work-related and daily activities compared with patients in which these structures were preserved<sup>9</sup>. On the other hand, modified radical ND showed no advantages compared with radical ND in terms of patients being able to return to pre-treatment employment status<sup>25</sup>. Furthermore, postoperative adjuvant radiotherapy (RT) probably has a detrimental effect on shoulder impairment<sup>4, 9</sup>. Many factors regarding shoulder syndrome have not been clarified. In particular, the actual incidence of long-term shoulder disability, the prognostic factors for shoulder recovery and the role of physiotherapy have not been clearly

**Table IV.** Italian version of SST.**Test Semplice della Spalla- SST**

Risponda sì o no alle seguenti domande in base alle attività che Lei riesce a svolgere oppure che pensa di poter svolgere.

Quando è disteso sul lato operato è a suo agio per quanto riguarda la spalla ed il braccio?

La spalla la lascia dormire serenamente?

Riesce ad infilare la camicia nei pantaloni con le proprie mani?

Riesce a mettere le mani dietro la testa con il gomito retto verso l'esterno?

Riesce a posizionare una moneta su di uno scaffale situato a livello delle spalle senza piegare il gomito?

Riesce ad alzare un peso di mezzo chilogrammo a livello delle spalle senza piegare il gomito?

Riesce ad alzare un peso di 3,5 chilogrammi a livello delle spalle senza piegare il gomito?

Riesce a trasportare con il braccio del lato operato un peso pari a 9 chilogrammi?

Pensa di poter lanciare una palla da tennis ad una distanza di 9 metri?

Pensa di poter lanciare una palla da tennis ad una distanza di 18 metri?

Con il braccio del lato operato riesce a lavarsi la spalla opposta?

La spalla Le permette di svolgere il Suo lavoro a tempo pieno?

assessed. At the moment, there is not a standardized method for the evaluation of shoulder dysfunction. Therefore, data already published are not homogeneous and cannot be compared.

Clinical evaluation of shoulder syndrome is not simple and several subjective and objective methods have been used. Among the subjective methods, many questionnaires have been proposed<sup>3-4,8</sup>. The majority of these investigate the general quality of life and are not specific for shoulder impairment. UCLA shoulder scale, SPADI, SST and Oxford Shoulder Score<sup>5,13-15,26</sup> are examples of questionnaires specifically designed for postoperative shoulder impairment. The Oxford Shoulder Score is a questionnaire that considers both pain and shoulder dysfunction. It was not available in Italian language during the collection of our data, but an Italian version was published in 2010<sup>26</sup>. It contains 12 questions (4 about pain and 8 about function) with 5 possible answers each.

Objective methods used for the evaluation of shoulder impairment are the electrophysiologic measures, including electromyography of the upper trapezius and sternocleidomastoid muscles and electroneurography of the SAN<sup>3,10,11</sup>. Both electromyography and electroneurography (intraoperatively and postoperatively) are feasible, but no correlation with clinical parameters has been demonstrated<sup>3,11</sup>.

The aim of the present study was to identify a method for the evaluation of shoulder pain and impairment and to adapt it for use in Italian patients. This could allow to collect homogeneous data from different Italian hospitals, to compare shoulder function before and after surgery and

to design Italian studies to assess the influence of adjuvant radiotherapy and efficacy of physiotherapy. In addition, it will be possible to identify the best physiotherapy programmes to improve functional outcomes and quality of life of these patients.

We decided to use a subjective method and not an objective measure because previous studies have shown that there is no clear correlation between electrophysiological recordings and clinical parameters regarding pain and dysfunction. In these studies, many patients presenting with a severe painful impairment had normal electromyographic recording and vice versa<sup>3,10,11</sup>.

Among all the English-language questionnaires, we decided to translate more than one questionnaire to obtain a wider spectrum of answers. UCLA shoulder scale, SPADI and SST were chosen because they specifically explore shoulder impairment. We decided not to use the scales evaluating general quality of life because this can be affected by surgical treatment of the primary tumour (e.g. laryngectomy or oropharyngeal resection) and by the presence of a postoperative depression. In our opinion, these scales can be used for the evaluation of shoulder impairment after ND, but should always be associated with a scale that specifically evaluates shoulder dysfunction.

The advantages of these questionnaires are that all are easy to use in a clinical setting, are inexpensive and take only a few minutes to complete. The UCLA shoulder scale and the SPADI give a more complete view of the problem because they explore both pain and shoulder dysfunction. In contrast, SST only evaluates shoulder impairment. The principal disadvantage of these questionnaires is that they do not evaluate quality of life. This problem can be solved by associating, in clinical practice, a more general quality of life scale that should also include depression since altered mood can influence the personal perception of postoperative shoulder dysfunction. Obviously, questionnaires are subjective methods of study and, if possible, they should be correlated with objective measures.

Statistical analysis showed a good internal consistency for all scales with a good reproducibility. Furthermore, the good correlations with the English version of UCLA shoulder scale, SPADI and SST validate the Italian versions, which can now be used in clinical practice.

## Conclusions

The Italian versions of UCLA shoulder scale, SPADI and SST are valid instruments and can be used in the clinical practice to assess shoulder dysfunction after ND in Italian patients. We believe that they will help Italian surgeons and physicians to obtain more homogeneous data about shoulder syndrome and to design new studies to improve treatment of shoulder dysfunction and improve quality of life in patients treated with ND for head and neck cancer.

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