頭頸部腫瘤臨床指引

亞洲大學亞洲大學聽力暨語言治療系 盛華老師撰寫

一、前言

頭頸部腫瘤包括口腔癌、口咽癌、鼻咽癌、喉癌、及下咽癌[1,2]。近年來，頭頸部腫瘤的治療方式會同時考量病人的存活率，以及言語及吞嚥功能[1,2]。

頭頸部腫瘤治療方式包括手術、雷射、放射治療及化學治療[3,4]。這些手術及非手術的治療方式會對言語及吞嚥功能造成損傷，影響生活品質[5-12]。影響的程度依腫瘤部位、治療方式、治療範圍(如：手術範圍、放射線劑量)、重建方式而有不同。這種差異性會影響日後的處置方式及治療成效[1,2]。

語言治療師受過言語及吞嚥異常專業訓練[13-15]，有能力提供治療前、治療中與治療後之言語和吞嚥評估、復健、及諮詢[16,17]。在處置過程中，語言治療師需要與專業團隊密切合作，協助團隊選擇最佳的治療方式。語言治療師亦可邀請病人、家屬及照顧者共同參與治療計畫，增加治療動機並給予心理支持[2,14]。

二、頭頸部腫瘤治療前之言語及吞嚥問題

頭頸部腫瘤在治療前就會出現言語及吞嚥問題[1,2,18-25]。腫瘤侵犯到咽部者有部分會有食團誤吸 (aspiration)[21,25]。晚期喉部腫瘤及下咽腫瘤會造成喉部閉合不足或咽部及上食道括約肌收縮功能減弱，造成病人吞嚥困難或食團誤吸[21,25]。若腫瘤侵犯至聲帶，會出現聲音沙啞症狀[4]。

三、治療後的言語及吞嚥問題

早期口腔癌及口咽癌以手術、雷射或放射治療為主，晚期則合併放射治療或化學治療；鼻咽癌則以放射治療及化學治療為主[3]。喉癌的治療主要為手術、雷射、放射治療或同步化學放射治療。下咽癌則以放射治療或同步化學放射治療方式保留言語及吞嚥器官。晚期喉癌，或腫瘤侵犯範圍較大的下咽癌病人，則做全喉切除或合併咽部切除手術與重建[4]。不論採用的是手術切除、放射治療、同步化學放射治療，或合併使用，均有高比例的病人在治療後立即出現言語及吞嚥困難，或在數年後出現晚期的言語及吞嚥困難[1,2,7,9,26]，影響病人生活品質[27,28]。

(一)手術對言語及吞嚥功能之影響

手術對病人言語及吞嚥障礙特性及嚴重度的影響，視手術方式、切除部位及切除範圍而定。術後的重建方式對言語及吞嚥功能也具有重要影響。

1. 口腔癌及口咽癌

手術治療方式包括局部切除 (local excision)、複雜性切除 (composite resection)及口腔與口咽重建等[3]。術後會造成說話清晰度不佳及構音錯誤，特別是全舌切除 (total glossectomy) 病人[29-38]。若手術範圍包括軟顎，會造成說話鼻音過重[1,39]。手術後亦會出現吞嚥問題。前口腔切除合併口底切除 (anterior oral cavity and the floor of mouth resections) 會影響吞嚥時舌骨及喉部移位、舌根及咽部運動、以及環咽肌張開能力。後口腔切除 (posterior oral cavity resection)，如：切除舌根、咽門弓、或側咽壁，會造成更嚴重的吞嚥問題，包括啟動咽部吞嚥遲緩、舌根後移能力減弱、以及咽部收縮能力不足[1,29,31,34,37,38,40-43]。

2. 喉癌及下咽癌

為了保留咽喉的言語及吞嚥功能，對於早期或某些中、晚期的喉癌或下咽癌病人可施予功能保留性手術，包括內視鏡雷射手術，以及開放式部分喉或部分咽喉切除手術[3,4]。內視鏡雷射顯微手術傷口小，術後傷口恢復快，對言語及吞嚥功能的影響相對較小[2,4,7,44-46]。而開放式手術對言語及吞嚥功能造成的影響端視切除的部位及範圍而定。一般而言，切除範圍越大，言語及吞嚥功能受損的情形也越嚴重。一旦手術嚴重影響病人喉部閉合或咽部收縮的能力，將嚴重影響病人吞嚥的安全性及效率[2,44,47-51]。手術若影響病人聲帶閉合、聲帶振動及發聲方式，會造成氣息聲、沙啞聲、音量過小等嗓音問題[2,44,52]。

晚期喉癌及下咽癌病人可能進行全喉切除手術或全咽喉切除手術[4]。全喉切除手術須拿掉喉部所有構造，術後咽部與氣管分離，並做永久之氣管造口(tracheostoma)；全咽喉切除手術除了拿掉整個喉部外，還切除部分或全部後咽壁及側咽壁，術後需用皮瓣重建吞嚥道[4,53]。病人一旦接受全喉切除手術或全咽喉切除後，無法發聲，呼吸改由氣管造口。許多病人亦出現吞嚥困難、嗅覺及味覺喪失[10,41,53-55]。最常見的吞嚥問題包括食物易卡在咽部，須要花費較長的時間才能將食物嚥下，必須限制食物質地，如液體或糊狀物等。吞嚥異常包括咽部收縮力減弱以及咽部狹窄，造成吞嚥時間增加及食團堆積咽部等。有的病人會出現咽皮瘻管或假會厭(pseudoepiglottis)，造成食團吸入氣管或堆積舌後，嚴重者必須使用鼻胃管進食[44,56,57]。病人常自覺身體有障礙、出現憂鬱及焦慮等負面情緒、不願意參加社交活動等，降低生活品質[4,10,50,53,58-61]。

(二)放射治療或同步化學放射治療對言語及吞嚥功能之影響

放射治療或同步化學放射治療雖然可以保留言語及吞嚥器官，但並未完整保留功能，仍常會影響嗓音、言語、及吞嚥功能。放射治療會對照射範圍的組織產生破壞，使病人在治療期間及治療後初期出現急性期反應，包括皮膚炎、口咽黏膜炎、唾液不足或口乾、疼痛及味覺改變，造成進食困難、說話不清晰、嗓音改變等[24,62-64]。放射治療後數個月或數年後會陸續產生晚期反應，造成口腔、咽部、頸部等照射部位軟組織僵硬、活動度降

低、肌肉無力；時間愈久，問題愈趨嚴重[2,26,59,65-67]。這些反應會使舌頭、軟顎、咽部、喉部活動度及力量不足。若病人接受同步化學放射治療，會加重化學治療毒性反應以及放射治療效應[2,26]。病人會出現說話不清晰、發音錯誤、鼻音過重、嗓音沙啞、單調音等言語及嗓音問題[31,68,69]。病人在吞嚥時無法有效咀嚼、攪拌及後送食物至咽部，導致口腔通過時間(oral transit time)變長，口腔食物殘留增多等。在咽部期會出現舌根後縮力量不足、顎咽閉鎖不全、啟動咽部期吞嚥延遲、咽部收縮肌無力、喉部上抬不足、喉部無法關閉以及環咽肌開啟不足等，導致咽部有過多食物殘留，極易造成誤吸 (aspiration)或滲入(penetration)[1,2,18,26,44,49,70-74]。因放射治療會造成喉部及咽部的感覺降低，一旦發生誤吸，常屬靜默式誤吸(silent aspiration)[75,76]。症狀嚴重者，甚至必須依賴管灌來維持營養，嚴重影響生活品質[2,6,11,12,31,62,63,67-69,77-84]。

(三)手術切除合併同步化學放射治療對言語及吞嚥功能之影響

術後若接受同步化放療，病人會因為組織切除合併化學放射療後的急性期反應使言語及吞嚥問題更加嚴重。晚期更會出現口咽肌肉纖維化、放射線後骨骼壞死等效應，造成說話及吞嚥生理異常，加重說話不清晰度、嗓音及吞嚥問題，導致言語功能、嗓音功能、吞嚥功能及生活品質較單獨接受手術治療者差[4,10,32.44,50,53,59,69,74,83,85-88]。

四、言語及吞嚥評估指引

手術、放射治療及化學治療前、治療中及治療後，應為病人進行言語及吞嚥評估，以了解言語及吞嚥功能的變化，協助訂定適當的言語及吞嚥復健計畫[1,2,12,14,17,21,22,44,89,90]。

(一)治療前的言語及吞嚥評估

1. 目的：建立病人於治療前之言語及吞嚥功能基準。經由此過程建立與病人的溝通管道及互信基礎[1,2,14,22]。
2. 內容：
   1) 病人資料收集：記錄病人病史、治療史、診斷、動機、期待、家人支持度等，以預測言語及吞嚥復健成效[1,2,14,16,17,44]。
   2) 語料留存錄音: 不論手術或非手術治療後，病人整個發聲以及言語構造與機轉均會改變，故治療前需錄音。語料必須包含所有子音與母音，以及含於該語言的超音段結構等。
   3) 吞嚥評估：提供必要之臨床吞嚥檢查(clinical examination of swallowing)、電視螢光吞嚥攝影檢查(videofluoroscopic evaluation of swallowing, VFSS)或纖維內視鏡吞嚥檢查(fiberoptic endoscopic evaluation of swallowing; FEES)，以確認吞嚥異常原因及徵候[1,2,16,21,44]。

4) 言語及嗓音功能檢查：提供言語清晰度檢查、嗓音評估、喉內視鏡檢查等[1,2,44]。

(二)治療中及治療後的言語及吞嚥評估

1. 目的：評估手術後組織缺損，以及放射治療或同步化放療期間及期後，對言語、嗓音、吞嚥、以及生活品質的影響。協助調整復健計畫，以及監測復健成效[1,2,44,50]。

2.內容：

1) 吞嚥臨床檢查：確認病人手術切除範圍及重建方式。評估口腔構造及運動功能、喉部功能、以及嘗試性吞嚥功能測試(trial swallow)。口腔運動功能包括舌頭活動幅度、穩定度及力度、下頷活動幅度及穩定度、張口幅度及雙唇閉合力量、軟顎上抬幅度、穩定度與對稱性、牙齒排列與數目、假牙配戴狀況、嘔吐反射強度、口腔各部位的敏感度、與舌頭各處對不同味覺的反應。喉部功能包括發聲音質、咳嗽力道等。嘗試性吞嚥包括觀察病患人吞口水、喝水或吞嚥安全食材是否嗆咳、吞嚥後音質是否改變、吞嚥時間是否過長、以及喉部上抬前滑的幅度是否足夠等。此外，也須評估病人心跳、呼吸、體溫、血氧濃度、查閱血壓、血中白血球數與發炎指數等生理變化，以及量體重與查閱血中紅血球與血紅素等營養狀態[1,2,14,44,50]。
2) 吞嚥儀器檢查：根據臨床吞嚥檢查結果，對有誤吸之高風險病人，安排 VFSS 或 FEES[1,2,16]。VFSS 可評估口腔及咽部期的吞嚥異常生理，包括舌頭動作型態、是否有滲入、是否有誤吸、誤吸的時間與份量、是否有殘留、殘留的部位及份量等。檢查時，分別給予不同質地(液體、黏稠液體、布丁、餅乾) 與不同份量(1 cc、3cc、5cc、10cc、杯子)的食物，以確認造成吞嚥障礙的生理原因。進行 VFSS 時，可讓病人使用代償策略，如：改變姿勢或調整食物質地及份量，或採用吞嚥手法，以確認該策略對改善吞嚥問題的效果。FEES 可觀察顎咽功能、喉部功能、以及咽部上方構造，但無法觀測口腔期及咽部期吞嚥啟動時的動作。此檢查是依據食物殘留的位置推測病患吞嚥問題。FEES 不需暴露在放射線中，儀器移動方便，適用於病房。最後，依據檢查結果擬訂個別化吞嚥復健計畫，改善吞嚥困難，確保病人能安全進食並攝取足夠的營養[1,2,14,26,44,50,89]。
3) 言語評估：語言治療前後，對有喉病人提供口腔構造及運動功能評估、言語清晰度檢查、以及嗓音評估；對無喉病人提供口腔構造及運動功能評估。言語清晰度檢查包括單音、單字及片語清晰度，特別是舌尖音及舌根音，以判斷說話精確度[1,2,14,39,44,62]。嗓音評估包括聽知覺評估嗓音音高、音量、嗓音各面向音質嚴重度，以及呼吸支持狀況[2,14,44,52]。
4) 嗓音儀器檢查：語言治療前後，對有喉病人提供喉內視鏡檢查 (laryngeal endoscopy) 或喉頭頻閃觀測儀檢查 (laryngeal stroboscopy)、聲學測量、以及氣體動力學測量。喉內視鏡檢查主要檢查喉部構造，確認喉部對稱性、聲門閉合度、喉部殘餘構造功能 (如：

喉部分切除術後)、喉部有無狹窄等[2,44,52]。喉頭頻閃觀測儀檢查主要檢查聲帶各面向振動能力，包括對稱性、規律性、聲門閉合度、黏膜波、及振幅[2,44,52]。聲學測量包括嗓音頻率、音強及不規律性[2,44,68]。氣體動力學測量包括發聲氣流速率、聲門下壓力及最長發聲時間[2,44,52,91]。經由上述檢查確認病人嗓音生理功能。

5) 生活品質測量：吞嚥及言語治療前後，使用具信效度之吞嚥生活品質及溝通生活品質問卷，測量病人吞嚥及言語功能對其生理、心理、及社交功能的影響[2,11,44,86,92-95]。

五、言語及吞嚥復健指引

手術、放射治療及化學治療前、治療中及治療後，需適時提供病人諮詢及衛教，並訂定適當的言語及吞嚥復健計畫，將病人治療後殘餘之言語及吞嚥功能最佳化，以減少對吞嚥及溝通生活品質的影響[1,2,14,44,89,96-98]。

(一) 治療前的言語及吞嚥復健

1. 目的：病人腫瘤治療計畫確立後，讓病人了解手術治療、放射治療及化學治療對言語及吞嚥功能的影響，以及整體復健方向，並給予必要的預防性運動訓練(preventive exercise training)，以提供病人心理支持，提高病人對復健計畫的參與度以及復健效果[1,2,14,44,47,98,99]。

2. 內容：

1) 衛生教育及諮詢：向病人及家屬說明腫瘤治療前及治療後對言語及吞嚥可能的影響、預防性運動訓練的重要性、治療後言語及吞嚥可能的復健模式以及預期效果[1,2,14,44,50,89]。對於計劃接受全喉切除手術的病人，向病人及家屬說明手術可能切除的器官以及各種言語復健方法。建議邀請無喉病友拜訪病人，分享治療及復健經驗，並提供無喉者相關資訊[14,16,17,44,53,100]。

2) 預防性運動訓練

對於計畫接受放射治療或化學放射治療的病人，宜預先教導言語及吞嚥運動，包括口腔、咽部及喉部的活動度及肌耐力運動，以預防或降低放射及化學治療對言語、嗓音及吞嚥的影響[1,2,97-99,101]。

(二) 治療中及治療後的言語及吞嚥復健

1. 目的：依據言語及吞嚥評估結果，為病人擬定言語及吞嚥復健計畫，將腫瘤治療後之口腔、喉部、及咽部殘餘功能最佳化。接受放射治療及化學治療之病人，於治療中及治療後應適時調整復健計畫，在盡量維持由口進食的原則下，避免發生吸入性肺炎及營養攝取不足[1,2,14,44,102,103]。

2. 內容：

1) 代償性技巧：使用改變姿勢、提供感覺刺激、調整食團大小及口味、選擇合適的食器、調整進食速度、以及調整食材質地、製作口腔膺復裝置等，改變食物的流向，以減少食物在口、咽部的堆積及降低誤吸的危險。代償性技巧通常是短期使用，只有在積極的復健運動已停止或對吞嚥功能無任何助益下，才會長期使用[1,2,44,50,54,104-106]。

2) 吞嚥復健：使用口腔、喉部及咽部等吞嚥運動以及吞嚥手法 (swallow maneuvers)改變吞嚥神經肌肉控制機轉，由此改善舌頭肌力及舌頭活動範圍、增加舌根及咽部壓力、強化喉部閉合能力、提升喉部上抬能力，以及增加環咽肌開啟幅度及時長，以提升吞嚥的安全性及效率。吞嚥運動包括嘴唇、舌頭、舌根、軟顎、顳顎關節、咽部肌肉運動、喉部及上食道括約肌的活動度及肌耐力運動[1,2,26,38,44,50,96,107-111]。吞嚥手法包括上聲門吞嚥法(supraglottic swallow)、超上聲門吞嚥法(super-supraglottic swallow)、用力吞嚥法(effortful swallow) 及孟德森吞嚥手法(Mendelsohn maneuver)[2,50,111,112]。接受放射治療及化學治療之病人，於治療期間宜持續進行吞嚥復健，以保留與吞嚥相關之肌肉的活動能力[1,2,44,98]。

3) 嗓音衛生教育：病人於手術後或化放療後，常因發聲困難，出現用力發聲或代償方式發聲，造成嗓音誤用。可教育病人使用舒適的音量及音高發聲，以避免造成機能亢進嗓音異常 (hyperfunctional voice disorder)[2,44]。

4) 嗓音復健：使用喉部閉合運動及生理嗓音治療策略，增進病人聲帶閉合能力、改善嗓音投射、強化嗓音耐久力、以及改善呼吸與發聲協調能力。喉部閉合運動包括嗓音功能運動（vocal function exercise）、上聲門吞嚥法等[2,44,113,114]。生理嗓音治療策略包括共鳴嗓音治療法（resonant voice therapy）、嗓音功能運動等方法[2,44,113,114]。在放射治療期間，喉部閉合運動不要太強烈。接受放射治療及化學治療之病人，於治療期間宜持續進行，以保留與發聲相關之肌肉的活動能力[2,44]。

5) 說話清晰度訓練：使用口腔運動及構音治療，增進說話清晰度與說話速度[1,14,44,115]。口腔運動包括嘴唇、舌頭、軟顎的活動度及肌耐力運動[1,14,44,112]。構音治療是矯正錯誤的構音行為至最佳狀態。接受放射治療及化學治療之病人，於治療期間宜持續進行，以保留與構音相關之肌肉的活動能力[1,44]。

6) 無喉者言語復健：接受全喉切除的病人，語言治療師可依其術後生理構造、健康狀況、需求、經濟能力等，選擇最適合的發聲方式訓練。發聲方式有食道語 (esophageal

speech)、氣動式人工發聲器 (pneumatic artificial larynx)、電子人工發聲器 (electronic artificial larynx)、及氣管食道發聲瓣 (tracheoesophageal voice prothesis)[14,44,100,116]。食道語為最自然的發聲方法，適合術後咽食道接合處區(pharyngoesophageal segment)阻力小者[44,100]。氣動式人工發聲器及電子人工發聲器的發聲音量大，但缺少語調變化。氣動式人工發聲器適合術後呼吸功能正常及手控制能力佳之病人。頸外式電子人工發聲器適合術後頸部組織無明顯纖維化、疤痕者。口內式電子人工發聲器則無此種限制[44,100]。氣管食道發聲瓣具有音量大、聲音長、及語調變化大的優點，適合用在術後咽食道區阻力小、手控制能力佳、以及願意自我照顧發聲瓣之病人[14,44,86,93,117]。此外，宜教導病人氣管造口清潔、環境濕度調整、氣切造口罩 (stoma cover) 及浴罩 (shower guard)使用等[44,53]。

(三)長期照護

1. 目的：語言治療師宜長期追蹤病人言語及吞嚥功能。當病人進入臨終照護時，提供諮詢及支持，改善病人臨終前進食安全性、滿意度及溝通能能力[2,14,44]。
2. 內容：
   1) 諮詢：向病人、家屬、臨終照護團隊說明改善病人進食能力及溝通能力的方式。
   2) 進食及溝通策略：提供進食改善策略，將病人吞嚥功能最佳化，以增進進食時病人與家屬的良性互動。對於有溝通困難病人，提供溝通改善策略或替代方式，以建立病人與家人溝通及臨終決策能力[2,14,44]。

參考文獻

1. Lazarus CL, Wall LR, Ward EC, Yiu EM. Speech and swallowing following oral, oropharyngeal, and nasopharyngeal cancer. In: Ward EC, van As-Brooks CJ, eds. Head and neck cancer : treatment, rehabilitation, and outcomes (2nd ed). Plural Pub; 2014:121-150.
2. Perkins KA, Hancock KL, Ward EC. Speech and swallowing following laryngeal and hypopharyngeal cancer. In: Ward EC, van As-Brooks CJ, eds. Head and neck cancer : treatment, rehabilitation, and outcomes (2nd ed). Plural Pub; 2014:173-240.
3. Tan IB, Stoker SD, Smeele LE. Oral, oropharyngeal, and nasopharyngeal cancer: Intervention approaches. In: Ward EC, van As-Brooks CJ, eds. Head and neck cancer : treatment, rehabilitation, and outcomes (2nd ed). Plural Pub; 2014:103-120.
4. Balm AJM. Laryngeal and hypopharyngeal cancer: Intervention approaches. In: Ward EC, van As-Brooks CJ, eds. Head and neck cancer : treatment, rehabilitation, and outcomes (2nd ed). Plural Pub; 2014:151-172.
5. Al-Mamgani A, Mehilal R, van Rooij PH, Tans L, Sewnaik A, Levendag PC. Toxicity, quality of life, and functional outcomes of 176 hypopharyngeal cancer patients treated by (chemo)radiation: the impact of treatment modality and radiation technique. Laryngoscope 2012;122:1789-95.
6. Cartmill B, Cornwell P, Ward E, Davidson W, Porceddu S. Long-term functional outcomes and patient perspective following altered fractionation radiotherapy with concomitant boost for

oropharyngeal cancer. Dysphagia 2012;27:481-90.
7. Lee TL, Wang LW, Mu-Hsin Chang P, Chu PY. Quality of life for patients with hypopharyngeal cancer after different therapeutic modalities. Head Neck 2013;35:280-5.
8. Li W, Yang Y, Xu Z, Liu F et al. Assessment of quality of life of patients with oral cavity cancer who have had defects reconstructed with free anterolateral thigh perforator flaps. British Journal of Oral and Maxillofacial Surgery 2013;51:497–501.
9. Cnossen IC, de Bree R, Rinkel RN. Computerized monitoring of patient-reported speech and swallowing problems in head and neck cancer patients in clinical practice. Supportive Care In Cancer 2012;20:2925-31.
10. Maclean J, Cotton S, Perry A. Dysphagia following a total laryngectomy: the effect on quality of life, functioning, and psychological well-being. Dysphagia 2009;24:314-21.
11. Nordgren M, Jannert M, Boysen M, et al. Health-related quality of life in patients with pharyngeal carcinoma: a five-year follow-up. Head Neck 2006;28:339-49.
12. van der Molen L, van Rossum MA, Jacobi I, et al. Pre- and posttreatment voice and speech outcomes in patients with advanced head and neck cancer treated with chemoradiotherapy: expert listeners' and patient's perception. J Voice 2012;26:664.e25-33.
13. ASHA. 2014 Standards and Implementation Procedures for the Certificate of Clinical Competence in Speech-Language Pathology. http://www.asha.org/Certification/2014-Speech-Language-Pathology-Certification-Standards/. Accessed 4.23, 2015.
14. Taylor-Goh SE. Royal College of Speech & Language Therapists clinical guidelines. Bicester: Speechmark; 2005.
15. 考選部. 專技人員考試法規：專門職業及技術人員高等考試語言治療師考試規則. http://wwwc.moex.gov.tw/main/ExamLaws/wfrmExamLaws.aspx?kind=3&menu_id=320&laws_id=131. Accessed 4.19, 2015.
16. Gilbert R, Devries-Aboud M, Winquist E, Waldron J, the Head and Neck Disease Site Group. The management of head and neck cancer in Ontario : organizational and clinical practice guideline recommendations. Cancer Care Ontario, Ontario, Canada, 2009.
17. Scottish Intercollegiate Guidelines. Diagnosis and management of head and neck cancer : a national clinical guideline. Edinburgh: SIGN; 2006.
18. Patterson JM, McColl E, Carding PN, Hildreth AJ, Kelly C, Wilson JA. Swallowing in the first year after chemoradiotherapy for head and neck cancer: clinician- and patient-reported outcomes. Head & Neck 2014;36:352-8.
19. Kalavrezos N, Cotrufo S, Govender R et al. Factors affecting swallow outcome following treatment for advanced oral and oropharyngeal malignancies. Head Neck 2014;36:47-54.
20. Starmer H, Gourin C. Speech Language Pathologist Evaluation Necessary in the Nonoperative Treatment of Head and Neck Cancer? The Laryngoscope 2013;123:1571-72.
21. Starmer H, Gourin C, Lua LL, Burkhead L. Pretreatment swallowing assessment in head and neck cancer patients. Laryngoscope 2011;121:1208-11.
22. Patterson J, Wilson JA. The clinical value of dysphagia preassessment in the management of head and neck cancer patients. Curr Opin Otolaryngol Head Neck Surg 2011;19:177-81.
23. Homma A, Sakashita T, Oridate N, et al. Importance of comorbidity in hypopharyngeal cancer. Head & Neck 2010;32:148-53.
24. Platteaux N, Dirix P, Dejaeger E, Nuyts S. Dysphagia in head and neck cancer patients treated with chemoradiotherapy. Dysphagia 2010;25:139-52.
25. Stenson KM, MacCracken E, List M, et al. Swallowing function in patients with head and neck

cancer prior to treatment. Arch Otolaryngol Head Neck Surg 2000;126:371-7.
26. Lazarus CL. Effects of chemoradiotherapy on voice and swallowing. Curr Opin Otolaryngol Head Neck Surg 2009;17:172-8.
27. Pierre CS, Dassonville O, Chamorey E et al. Long-term quality of life and its predictive factors after oncologic surgery and microvascular reconstruction in patients with oral or oropharyngeal cancer. European Archives of Oto-Rhino-Laryngology 2014;271:801-7.
28. PauloskiBR, Rademaker AW, Logemann JA et al. Swallow function and perception of dysphagia in patients with head and neck cancer. Head & Neck 2002;24:555-65.
29. Lam L, Samman N. Speech and swallowing following tongue cancer surgery and free flap reconstruction – A systematic review. Oral Oncology 2013;49:507–24.
30. Dziegielewski PT, Ho ML, Rieger J, Singh P, Langille M, Harris JR, Seikaly H. Total glossectomy with laryngeal preservation and free flap reconstruction: objective functional outcomes and systematic review of the literature. The Laryngoscope 2013:1531-4995.
31. Dwivedi RC, St Rose S, Chisholm EJ et al. Evaluation of swallowing by Sydney Swallow Questionnaire (SSQ) in oral and oropharyngeal cancer patients treated with primary surgery. Dysphagia 2012;27:491-7.
32. Borggreven PA, Verdonck-de Leeuw I, Langendijk JA et al. Speech outcome after surgical treatment for oral and oropharyngeal cancer: a longitudinal assessment of patients reconstructed by a microvascular flap. Head Neck 2005;27:785-93.
33. Pauloski BR, Rademaker AW, Logemann JA, Colangelo LA. Speech and swallowing in irradiated and nonirradiated postsurgical oral cancer patients. Otolaryngology--Head And Neck Surgery 1998;118:616-24.
34. McConnel FM, Pauloski BR, Logemann JA et al. Functional results of primary closure vs flaps in oropharyngeal reconstruction: a prospective study of speech and swallowing. Arch Otolaryngol Head Neck Surg 1998;124:625-30.
35. Dios PD, Feijoo JF, Ferreiro MC, Alvarez JA. Functional consequences of partial glossectomy. Journal of Oral and Maxillofacial Surgery 1994;52:12-14.
36. Pauloski BR, Logemann JA, Rademaker AW et al. Speech and swallowing function after oral and oropharyngeal resections: one-year follow-up. Head Neck 1994;16:313-22.
37. Pauloski BR, Logemann JA, Rademaker AW et al. Speech and swallowing function after anterior tongue and floor of mouth resection with distal flap reconstruction. Journal of Speech and Hearing Research 1993;36:267-76.
38. Logemann JA, PauloskiBR, Rademaker AW et al. Speech and swallow function after tonsil/base of tongue resection with primary closure. Journal of Speech and Hearing Research 1993;36:448-26.
39. Katoh C, Saitoh M, Tsuneyuki M et al. Blowing ratio as an evaluation tool for velopharyngeal function after oral and oropharyngeal cancer resection.HeadNeck 2010;32:1012-18.
40. Hey C, Lange BP, Eberle S et al. Water swallow screening test for patients after surgery for head and neck cancer: early identification of dysphagia, aspiration and limitations of oral intake. Anticancer Research 2013;33:4017-21.
41. Manikantan K, SKhode S, Sayed SI et al. Dysphagia in head and neck cancer. Cancer Treatment Reviews 2009;35:724–732.
42. PauloskiBR, Rademaker AW, Logemann JA et al. Surgical variables affecting swallowing in patients treated for oral/oropharyngeal cancer. Head Neck 2004;26:625-36.

43. Pauloski BR, Logemann JA, Fox JC, Colangelo LA. Biomechanical analysis of the pharyngeal swallow in postsurgical patients with anterior tongue and floor of mouth resection and distal flap reconstruction. Journal of Speech and Hearing Research 1995;38:0022-4685.
44. 盛華、蕭麗君。下咽癌治療前後言語、吞嚥之評估與復健。載於：國家衛生研究院主編。下咽癌臨床診療指引。苗栗；國家衛生研究院，出版中。
45. Remmelts AJ, Hoebers FJ, Klop WM et al. Evaluation of lasersurgery and radiotherapy as treatment modalities in earlystagelaryngeal carcinoma: tumour outcome and quality of voice. European Archives Of Oto-Rhino-Laryngology 2013;270:2079-87.
46. Suarez C, Rodrigo JP, Silver CE, et al. Laser surgery for early to moderately advanced glottic, supraglottic, and hypopharyngeal cancers. Head Neck 2012;34:1028-35.
47. Granell J, Garrido L, Millas T, Gutierrez-Fonseca R. Management of oropharyngeal dysphagia in laryngeal and hypopharyngeal cancer. Int J Otolaryngol 2012;2012:157630.
48. Lewin JS, Hutcheson KA, Barringer DA et al. Functional analysis of swallowing outcomes after supracricoid partiallaryngectomy. Head Neck 2008;30:559-66.
49. Mittal BB, Pauloski BR, Haraf DJ, et al. Swallowing dysfunction--preventative and rehabilitation strategies in patients with head-and-neck cancers treated with surgery, radiotherapy, and chemotherapy: a critical review. Int J Radiat Oncol Biol Phys 2003;57:1219-30.
50. Logemann JA. Evaluation and treatment of swallowing disorders. Austin, Tex.: PRO-ED; 1998.
51. Rademaker AW, Logemann JA, Pauloski BR. Recovery of postoperative swallowing in patients undergoing partial laryngectomy. Head Neck 1993;15:325-34.
52. Webster KT, Samlan RA, Jones B, Bunton K, Tufano RP. Supracricoid partiallaryngectomy: swallowing, voice, and speech outcomes. The Annals of Otology, Rhinology, and Laryngology 2010;119:10-6.
53. Ward EC, Acton LM, Spurgin A.Stoma care and appliance. In: Ward EC, van As-Brooks CJ, eds. Head and neck cancer : treatment, rehabilitation, and outcomes (2nd ed). Plural Pub; 2014:375-400.
54. Pauloski BR, Logemann JA, Rademaker AW et al. Effects of enhanced bolus flavors on oropharyngeal swallow in patients treated for head and neck cancer. Head Neck 2013;35:1124-31.
55. Brook I. Eating again: A physician'spersonal experience after laryngectomy. Nutrition and Cancer 2012;64:635–636.
56. Maclean J, Szczesniak M, Cotton S, Cook I, Perry A. Impact of a laryngectomy and surgical closure technique on swallow biomechanics and dysphagia severity.Otolaryngol Head Neck Surg 2011;144:21-8.
57. Chone CT, Spina AL, Barcellos IH, Servin HH, Crespo AN. A prospective study of long-term dysphagia following total laryngectomy. B-ENT 2011;7:103-9.
58. Sharp DA, Theile DR, Cook R, Coman WB. Long-term functional speech and swallowing outcomes following pharyngolaryngectomy with free jejunal flap reconstruction. Annals Of Plastic Surgery 2010;64:743-6.
59. Edels Y. Laryngectomy: Rehabilitation and surgical voice restoration. The Royal Marsden School of Cancer Nursing and Rehabilitation, Coursework notes, 2007.
60. Ward EC, Bishop B, Frisby J, Stevens M. Swallowing outcomes following laryngectomy and

pharyngolaryngectomy. Arch Otolaryngol Head Neck Surg 2002;128:181-6.
61. Balfe DM. Dysphagia after laryngeal surgery: radiologic assessment. Dysphagia 1990;5:20-34.
62. Jacobi I; van Rossum MA; van der Molen L; Hilgers FJ; van den Brekel MW. Acoustic analysis of changes in articulation proficiency in patients with advanced head and neck cancer treated with chemoradiotherapy. The Annals of Otology, Rhinology, and Laryngology 2013;122:754-62.
63. Jacobi I, van der Molen L, Huiskens H, van Rossum MA, Hilgers FJ. Voice and speech outcomes of chemoradiation for advanced head and neck cancer: a systematic review. Eur Arch Otorhinolaryngol. 2010;267:1495-505.
64. Pauloski BR, Rademaker AW, Logemann JA, et al. Relationship between swallow motility disorders on videofluorography and oral intake in patients treated for head and neck cancer with radiotherapy with or without chemotherapy. Head Neck 2006;28:1069-76.
65. Servagi-Vernata S, Ali D, Roubieuc C et al. Dysphagia after radiotherapy: State of the art and prevention. European Annals of Otorhinolaryngology, Head and Neck diseases 2015;132:25-29.
66. Szczesniak MM, Maclean J, Zhang T, Grahamx PH, Cook IJ. Persistent Dysphagia after head and neck radiotherapy: A common and under-reported complication with significant effect on non-cancer-related mortality. Clinical Oncology 2014;26:697-703.
67. Wall LR, Ward EC, Cartmill B, Hill AJ. Physiological changes to the swallowing mechanism following (chemo)radiotherapy for head and neck cancer: a systematic review. Dysphagia 2013;28:481-93.
68. Lau VH, Leonard RJ, Goodrich S, Luu Q. Voice quality after organ-preservation therapy with definitive radiotherapy for laryngeal cancer. Head Neck 2012;34:943-48.
69. Suarez-Cunqueiro M, Schramm A, Schoen R et al. Speech and Swallowing Impairment After Treatment for Oral and Oropharyngeal Cancer. Arch Otolaryngol Head Neck Surg. 2008; 134:1299-1304.
70. Pauloski BR, Rademaker AW, Logemann JA, Discekici-Harris M, Mittal BB. Comparison of swallowing function after intensity-modulated radiation therapy and conventional radiotherapy for head and neck cancer. Head Neck 2014 Jun 7. Date of Electronic Publication: 2014 Jun 7.
71. van der Molen L, van Rossum MA, Burkhead LM, Smeele LE, Hilgers FJ. Functional outcomes and rehabilitation strategies in patients treated with chemoradiotherapy for advanced head and neck cancer: a systematic review. Eur Arch Otorhinolaryngol 2009;266:889-900.
72. Hutcheson KA, Barringer DA, Rosenthal DI, May AH, Roberts DB, Lewin JS. Swallowing outcomes after radiotherapy for laryngeal carcinoma. Arch Otolaryngol Head Neck Surg 2008; 134:178-83.
73. Nguyen NP, Moltz CC, Frank C. Aspiration rate following nonsurgical therapy forlaryngealcancer. Journal For Oto-Rhino-Laryngology And Its Related Specialties 2007;69:116-20.
74. Nguyen NP, Moltz CC, Frank C et al. Dysphagia severity following chemoradiation and postoperative radiation for head and neck cancer. European Journal of Radiology 2006;59: 453-59.
75. Nguyen NP, Smith HJ, Dutta S, et al. Aspiration occurence during chemoradiation for head and neck cancer. Anticancer Res 2007;27:1669-72.
76. Eisbruch A, Lyden T, Bradford CR, et al. Objective assessment of swallowing dysfunction and aspiration after radiation concurrent with chemotherapy for head-and-neck cancer. Int J Radiat

Oncol Biol Phys 2002;53:23-8.
77. Vainshtein JM; Griffith KA; Feng FY et al. Patient-reported voice and speech outcomes after whole-neck intensity modulated radiation therapy and chemotherapy for oropharyngeal cancer: prospective longitudinal study. International Journal of Radiation Oncology, Biology, Physics 2014;89:973-80.
78. Hutcheson KA, Lewin JS, Barringer DA, et al. Late dysphagia after radiotherapy-based treatment of head and neck cancer. Cancer 2012;118:5793-9.
79. Agarwal J, Palwe V, Dutta D, et al. Objective assessment of swallowing function after definitive concurrent (chemo)radiotherapy in patients with head and neck cancer. Dysphagia 2011;26:399-406.
80. Mouw KW, Haraf DJ, Stenson KM, et al. Factors associated with long-term speech and swallowing outcomes after chemoradiotherapy for locoregionally advanced head and neck cancer. Arch Otolaryngol Head Neck Surg 2010;136:1226-34.
81. Logemann JA, PauloskiBR, Rademaker AW. Swallowing disorders in the first year after radiation and chemoradiation. Head Neck 2008;30:148-58.
82. Bleier BS, Levine MS, Mick R. Dysphagia after chemoradiation: analysis by modified barium swallow. The Annals of Otology, Rhinology, and Laryngology 2007;116:837-41.
83. Meyer TK, Kuhn JC, Campbell BH, Marbella AM, Myers KB, Layde PM. Speech intelligibility and quality of life in head and neck cancer survivors. Laryngoscope 2004;114:1977-81.
84. Meleca RJ, Dworkin JP, Kewson DT, Stachler RJ, Hill SL. Functional outcomes following nonsurgical treatment for advanced-stage laryngeal carcinoma. Laryngoscope 2003;113: 720-8.
85. Zu Y, Narayanan SS, Kim YC et al. Evaluation of swallow function after tongue cancer treatment using real-time magnetic resonance imaging: a pilot study. JAMA Otolaryngol Head Neck Surg 2013;139:1312-9.
86. Robertson SM, Yeo JC, Dunnet C, Young D, Mackenzie K. Voice, swallowing, and quality of life after total laryngectomy: results of the west of Scotland laryngectomy audit. Head Neck 2012;34:59-65.
87. de Bruijn MJ, ten Bosch L, Kuik DJ. Objective acoustic-phonetic speech analysis in patients treated for oral or oropharyngeal cancer. Folia Phoniatrica et Logopaedica 2009;61:180-7.
88. Pauloski BR, Logemann JA. Impact of tongue base and posterior pharyngeal wall biomechanics on pharyngeal clearance in irradiated postsurgical oral and oropharyngeal cancer patients. Head Neck 2000;22:120-31.
89. Hutcheson KA, Lewin JS. Functional assessment and rehabilitation: how to maximize outcomes. Otolaryngol Clin North Am 2013;46:657-70.
90. Murphy BA, Gilbert J. Dysphagia in head and neck cancer patients treated with radiation: Assessment, Sequelae, and Rehabilitation. Semin Radiat Oncol 2009;19:35-42.
91. Baken RJ, Orlikoff RF. Clinical measurement of speech and voice. San Diego: Singular; 2000.
92. Boyapati RP, Shah KC, Flood V, Stassen LFA. Quality of life outcome measures using UW-QOL questionnaire v4 in early oral cancer/squamous cell cancer resections of the tongue and floor of mouth with reconstruction solely using local methods. British Journal of Oral and Maxillofacial Surgery 2013;51:502-7.
93. Moukarbel RV, Doyle PC, Yoo JH, Franklin JH, Day AM, Fung K. Voice-related quality of life

(V-RQOL) outcomes in laryngectomees. Head Neck 2011;33:31-6.
94. Boscolo-Rizzo P, Maronato F, Marchiori C, Gava A, Da Mosto MC. Long-term quality of life after total laryngectomy and postoperative radiotherapy versus concurrent chemoradiotherapy for laryngeal preservation. Laryngoscope 2008;118:300-6.
95. Nijdam WM, Levendag PC, Noever I, Schmitz PI, Uyl-de Groot CA. Longitudinal changes in quality of life and costs in long-term survivors of tumors of the oropharynx treated with brachytherapy or surgery. Brachytherapy 2008;7:343-50.
96. Virani A, Kunduk M, Fink DS, McWhorter AJ. Effects of 2 different swallowing exercise regimens during organ-preservation therapies for head and neck cancers on swallowing function. Head Neck 2015;37:162-70.
97. van der Molen L, van Rossum MA, Burkhead LM, Smeele LE, Rasch CR, Hilgers FJ. A randomized preventive rehabilitation trial in advanced head and neck cancer patients treated with chemoradiotherapy: feasibility, compliance, and short-term effects. Dysphagia 2011;26: 155-70.
98. Carroll WR, Locher JL, Canon CL, Bohannon IA, McColloch NL, Magnuson JS. Pretreatment swallowing exercises improve swallow function after chemoradiation. Laryngoscope 2008;118:39-43.
99. Paleri V, Roe JW, Strojan P et al. Strategies to reduce long-term postchemoradiation dysphagia in patients with head and neck cancer: an evidence-based review. Head Neck 2014;36:431-43.
100. Searl JP, Reeves IS. Nonsurgical voice restoration following total laryngectomy. In: Ward EC, van As-Brooks CJ, eds. Head and neck cancer : treatment, rehabilitation, and outcomes(2nd ed). San Diego: Plural Pub;2014:263-300.
101. Kulbersh BD, Rosenthal EL, McGrew BM, et al. Pretreatment, preoperative swallowing exercises may improve dysphagia quality of life. Laryngoscope 2006;116:883-6.
102. Lewin JS. Dysphagia after chemoradiation: prevention and treatment. Int J Radiat Oncol Biol Phys 2007;69(2 Suppl):S86-87.
103. Rosenthal DI, Lewin JS, Eisbruch A. Prevention and treatment of dysphagia and aspiration after chemoradiation for head and neck cancer. J Clin Oncol 2006;24:2636-43.
104. Rogus-Pulia NM, William S, Pierce M, Mittal BB, Zecker SG, Logemann J. Bolus effects on patient awareness of swallowing difficulty and swallow physiology after chemoradiation for head and neck cancer. Head Neck 2014 May 19; Date of Electronic Publication: 2014 May 19.
105. Sakaizumi K, Simoda N, Kodama M, Toyokura M; Masakado Y. Swallowing appliance: intraoral reshaping prosthesis for dysphagia secondary to oral floor cancer: a pilot study. American Journal of Physical Medicine & Rehabilitation 2014;93:1008-13.
106. Logemann JA; Rademaker AW; Pauloski BR; Kahrilas PJ. Effects of postural change on aspiration in head and neck surgical patients. Otolaryngol Head Neck Surg 1994;110:222-7.
107. Lenius K, Stierwalt J, LaPointe LL, Bourgeois M, Carnaby G, Crary M. Effects of Lingual Effort on Swallow Pressures Following Radiation Treatment. Journal of Speech, Language, and Hearing Research 2015; Mar 25.Date of Electronic Publication: 2015 Mar 25.
108. Lazarus CL, Husaini H, Anand SM et al. Tongue strength as a predictor of functional outcomes and quality of life after tongue cancer surgery. The Annals Of Otology, Rhinology, And Laryngology 2013;122:386-97.
109. Crary MA, Carnaby GD, LaGorio LA, Carvajal PJ. Functional and physiological outcomes from an exercise-based dysphagia therapy: a pilot investigation of the McNeill Dysphagia Therapy Program. Archives of Physical Medicine and Rehabilitation 2012;93:1173-8.

110. Speyer R, Baijens L, Heijnen M, Zwijnenberg I. Effects of Therapy in Oropharyngeal Dysphagia by Speech and Language Therapists: A Systematic Review. Dysphagia 2010; 25:40-65.
111. Logemann JA, PauloskiBR, Rademaker AW, Colangelo LA. Super-supraglottic swallow in irradiated head and neck cancer patients. Head Neck 1997;19:535-40.
112. Lazarus CL. Management of swallowing disorders in head and neck cancer patients: optimal patterns of care. Semin Speech Lang 2000;21:293-309.
113. Stemple JC, Hapner ER. Voice therapy : Clinical case studies (4th ed). San Diego: Plural Pub; 2014:189-268.
114. Stemple JC, Roy N, Klaben BK. Clincal vocal pathology : Theory and management (4th ed). San Diego: Plural Pub; 2014:208-209,256-263.
115. Okada N, Otsuka T, Fujita A, Noguchi T, Jinbu Y, Kusama M. Effect of articulatory rehabilitation after oral cancer surgery on higher brain activation. International Journal Of Oral And Maxillofacial Surgery 2014;43:933-40.
116. Bien' S, Rinaldo A, Silver CE. History of voice rehabilitation following laryngectomy. Laryngoscope 2008;118:453-8.
117. van As-Brooks CJ, Fuller DP. Prosthetic tracheoesophageal voice restoration following total laryngectomy. In: Ward EC, van As-Brooks CJ, eds. Head and neck cancer: treatment, rehabilitation, and outcomes (2nd ed). San Diego: Plural Pub; 2014:301-342.

附錄、專有名詞

1. 病人 (patient, case)
2. 誤吸 (aspiration)
3. 氣管造口(tracheostoma)
4. 假會厭(pseudoepiglottis)
5. 口腔通過時間(oral transit time)
6. 滲入(penetration)
7. 靜默式誤吸(silent aspiration)
8. 臨床吞嚥檢查(clinical examination of swallowing)
9. 電視螢光吞嚥攝影檢查(videofluoroscopic evaluation of swallowing, VFSS)
10. 纖維內視鏡吞嚥檢查(fiberoptic endoscopic evaluation of swallowing; FEES)
11. 嘗試性吞嚥功能測試(trial swallow)
12. 喉內視鏡檢查 (laryngeal endoscopy)
13. 喉頭頻閃觀測儀檢查 (laryngeal stroboscopy)
14. 預防性運動訓練(preventive exercise training)
15. 口腔膺復裝置 (oral prosthesis)
16. 吞嚥手法 (swallow maneuvers)
17. 上聲門吞嚥法(supraglottic swallow)
18. 超上聲門吞嚥法(super-supraglottic swallow)
19. 用力吞嚥法(effortful swallow)

20. 孟德森吞嚥手法(Mendelsohn maneuver)
21. 機能亢進嗓音異常 (hyperfunctional voice disorder)
22. 生理嗓音治療 (physiologic voice therapy)
23. 嗓音功能運動（vocal function exercise）
24. 共鳴嗓音治療法（resonant voice therapy）
25. 食道語 (esophageal speech)
26. 氣動式人工發聲器 (pneumatic artificial larynx)
27. 電子人工發聲器 (electronic artificial larynx)
28. 氣管食道發聲瓣 (tracheoesophageal voice prothesis)
29. 氣切造口罩 (stoma cover)
30. 浴罩 (shower guard)