

Diabetes and Upper-Limb Conditions

Overview

- Assessment of upper limb locomotor disease in diabetes should include an estimate of glycaemic control and a search for other complications [1].
- Examination of the hands and shoulders should be included in the evaluation of patients with diabetes [3].
- The prevalence of musculoskeletal disorders in people with type 2 Diabetes mellitus remains high despite advances in medical management over the last two decades [4].
- Diabetes exacerbates the burden of surgical upper-extremity infections, characterized by more proximal locations, deeper involved anatomy, broader pathogenic microbiology, increased need for repeat drainage, and higher risk for amputation [5].
- The presence of diabetes mellitus rather than its severity was the most important factor for developing trigger digit [7].
- The prevalence of frozen shoulder is less than previously reported but still greater in diabetic patients [13].
- Musculoskeletal hand disorders were prevalent in type 2 diabetes mellitus patients in Jordan [37].
- Both shoulders were involved in 36 patients (4.5 per cent) with periarthrititis of the shoulder and there was a high incidence in insulin-dependent diabetics [2].

Background & Causes

- Upper limb musculoskeletal abnormalities and poor metabolic control in diabetes are associated [1].
- There is continuing gradual deterioration of limited joint mobility with increasing duration of disease in diabetes mellitus [6].
- Finger joint contractures are prevalent only in longstanding diabetics with a disease duration of nine years or more [6].
- The presence of diabetes mellitus rather than its severity was the most important factor for developing trigger digit after carpal tunnel release [7].
- Corticosteroid injections in the hand transiently increase blood glucose levels in diabetic patients [9].

- Insulin dependence is associated with increased risk of complications after upper extremity surgery in diabetic patients [14].
- NIDDM patients did not have an increased rate of complications relative to nondiabetic patients [14].
- Patients with painful shoulders, irrespective of having type 2 diabetes mellitus, seem to have abnormal shoulder muscles [15].
- In adults with hand syndromes associated with diabetes, disability was related to impaired muscle function and carpal tunnel syndrome [16].
- Type 2 diabetes may be a cause of frozen shoulder but the effect is not mediated by metabolic health [20].
- Diabetes is a likely causal risk factor for frozen shoulder, likely through a pathway involving long-term high blood glucose levels [30].
- Type 2 diabetes does not seem to be a risk factor for carpal tunnel syndrome [32].
- Among patients with diabetes who had CTS, higher RAGE expression was observed in those with more severe disease, suggesting that RAGE-mediated pathways may play a role in the pathophysiology of CTS in patients with diabetes [33].
- Molecular and pathological studies in the posterior interosseous nerve provide a potential molecular and pathological basis for the predisposition of diabetic patients to the development of CTS [34].
- Whole-transcriptome expression profiles demonstrate a fundamentally different underlying pathophysiology when comparing diabetic AC with idiopathic AC, suggesting that these conditions are distinct clinical entities [35].

Symptoms & Presentation

- There is continuing gradual deterioration with increasing duration of disease in limited joint mobility in diabetes mellitus [6].
- Shoulder pain and disability are common, and persistent in adults with diabetes [8].
- Patients with diabetes mellitus reported shoulder pain and/or disability, with 63% (149/236) indicating such issues and a median SPADI score of 10.0 [12].
- Patients with and without diabetes experienced similar pain except during exertion regarding range of motion recovery in diabetic frozen shoulder [17].
- Diabetes mellitus is associated with a variety of hand manifestations including stenosing tenosynovitis, Dupuytren's contracture, carpal tunnel syndrome, and limited joint mobility, which often present with multiple visits for hand conditions over time [19].
- Clinicians should consider spontaneous diabetic myonecrosis in diabetic patients with atraumatic acute-onset pain and swelling in the hand to avoid confusion with other inflammatory, infectious, or vascular conditions [21].
- Diabetic patients are reported to have more residual pain, reduced motion and inferior function compared to idiopathic cases following arthroscopic capsular release for shoulder adhesive capsulitis [28].

- The moderate correlations between upper and lower extremity range of motion, strength, and function suggest a concurrent development of musculoskeletal complications in people with DM [31].

Management

- Percutaneous release with or without simultaneous corticosteroid injection has shown promising results and is equally effective and safe in diabetics and nondiabetics for the management of trigger finger [23].
- Excision of the ulnar slip of the flexor digitorum superficialis with or without A1 pulley release is a safe and effective treatment for stenosing flexor tenosynovitis in the diabetic patient [25].
- The best current evidence supports the efficacy of surgical interventions for the management of upper limb conditions in diabetic individuals [10].
- Additional research is required to determine whether surgical treatment outcomes in diabetics are equivalent to those of nondiabetic patients [10].
- Additional research is required to determine whether diabetes is associated with an increased risk of complications following surgical intervention [10].
- Steroid injection into the shoulder causes glycemic changes that are short-lived, mostly limited to the 2-3 days after the injection [26].
- None of the patients in the study on shoulder steroid injections required any change in antidiabetic treatment [26].
- Platelet-rich plasma injection is a safe and well-tolerated method for adhesive capsulitis management in diabetic patients [24].
- When shoulder mobilization was achievable with gentle manipulation under anesthesia, the outcome was satisfactory in both patients with IDDM and those with NIDDM [27].
- The results of arthroscopic release for frozen shoulder in diabetics were significantly worse than those in non-diabetics six months post-operatively [18].
- There is a tendency towards persistent limitation of movement two years after arthroscopic release operation for frozen shoulder in diabetic patients [18].
- Patients with and without diabetes experienced similar pain from frozen shoulder except during exertion [17].
- Long-term prospective randomised controlled trials on the effects of exercise in preventing musculoskeletal complications and disability in diabetics are needed [11].

Key Considerations

- There is continuing gradual deterioration of limited joint mobility with increasing duration of disease [6].
- Additional research is required to determine whether treatment outcomes for diabetic patients are equivalent to those of nondiabetic patients [10].

- Additional research is required to determine whether diabetes is associated with an increased risk of complications [10].
- There is a tendency towards persistent limitation of movement two years after arthroscopic release for frozen shoulder in diabetic patients [18].
- Long-term improvement in patients with diabetes remained after carpal tunnel release to the same extent as for patients without diabetes [36].
- Patients with diabetes experience more symptoms both before and after open carpal tunnel release [38].
- Patients with diabetes can expect the same relative improvement from open carpal tunnel release as patients without diabetes [38].
- More than one third of patients with diabetic hand infections are diabetic [39].
- Insulin-dependent diabetic patients (NIDDM) did not have an increased rate of complications relative to nondiabetic patients after upper extremity surgery [14].

Key Evidence

- [L3] Assessment of upper limb locomotor disease in diabetes should include an estimate of glycaemic control and a search for other complications. [1] ([10.1016/j.ejim.2009.08.001](https://doi.org/10.1016/j.ejim.2009.08.001))
- [L4] In 36 patients (4.5 per cent.), both shoulders were involved and there was a high incidence in insulin-dependent diabetics. [2] ([10.1136/ard.31.1.69](https://doi.org/10.1136/ard.31.1.69))
- [L3] Examination of the hands and shoulders should be included in the evaluation of patients with diabetes. [3] ([10.1016/s0002-9343\(02\)01045-8](https://doi.org/10.1016/s0002-9343(02)01045-8))
- [L3] The prevalence of musculoskeletal disorders in people with type 2 Diabetes mellitus remains high despite advances in medical management over the last two decades. [4] ([10.1016/j.jht.2021.04.013](https://doi.org/10.1016/j.jht.2021.04.013))
- [L2] Diabetes exacerbates the burden of surgical upper-extremity infections, characterized by more proximal locations, deeper involved anatomy, broader pathogenic microbiology, increased need for repeat drainage, and higher risk for amputation. [5] ([10.1016/j.jhsa.2017.11.003](https://doi.org/10.1016/j.jhsa.2017.11.003))
- [L3] There is continuing gradual deterioration with increasing duration of disease, though finger joint contractures are prevalent only in longstanding diabetics with a disease duration of nine years or more. [6] ([10.1136/ard.44.2.93](https://doi.org/10.1136/ard.44.2.93))
- [L4] The presence of diabetes mellitus rather than its severity was the most important factor for developing trigger digit. [7] ([10.1016/j.jhsa.2013.10.023](https://doi.org/10.1016/j.jhsa.2013.10.023))
- [L4] Shoulder pain and disability are common, and persistent in adults with diabetes. [8] ([10.1093/rheumatology/ken333](https://doi.org/10.1093/rheumatology/ken333))
- [L3] Corticosteroid injections in the hand transiently increase blood glucose levels in diabetic patients. [9] ([10.1016/j.jhsa.2014.01.014](https://doi.org/10.1016/j.jhsa.2014.01.014))
- [L4] The best current evidence supports the efficacy of surgical interventions for the management of these conditions in diabetic individuals; however, additional research is required to determine whether the

treatment outcomes are equivalent to those of nondiabetic patients, and whether diabetes is associated with an increased risk of complications. [10] ([10.1016/j.jhsa.2011.10.002](#))

- [L3] Long-term prospective randomised controlled trials on the effects of exercise in preventing musculoskeletal complications and disability in diabetics are needed. [11] ([10.1007/s10067-003-0704-7](#))
- [L3] Patients with diabetes mellitus reported shoulder pain and/or disability, with 63% (149/236) indicating such issues and a median SPADI score of 10.0. [12] ([10.1016/j.physio.2014.07.003](#))
- [L3] The prevalence of frozen shoulder is less than previously reported but still greater in diabetic patients. [13] ([10.1016/j.jse.2007.02.133](#))
- [L2] The NIDDM patients did not have an increased rate of complications relative to nondiabetic patients. [14] ([10.1016/j.jhsa.2018.06.006](#))
- [L3] Patients with painful shoulders, irrespective of having type 2 diabetes mellitus, seem to have abnormal shoulder muscles. [15] ([10.1186/s12891-022-05627-9](#))
- [L4] In adults with hand syndromes associated with diabetes, disability was related to impaired muscle function and carpal tunnel syndrome. [16] ([10.3899/jrheum.090239](#))
- [L3] Patients with and without diabetes experienced similar pain except during exertion. [17] ([10.1177/0300060516675112](#))
- [L3] The results in diabetics were significantly worse than those in non-diabetics six months post-operatively with a tendency towards persistent limitation of movement two years after operation. [18] ([10.1302/0301-620x.96b10.34476](#))
- [L4] Diabetes mellitus is associated with a variety of hand manifestations including stenosing tenosynovitis, Dupuytren's contracture, carpal tunnel syndrome, and limited joint mobility, which often present with multiple visits for hand conditions over time. [19] ([10.1016/j.jhsa.2008.01.038](#))
- [L2] This study suggests that type 2 diabetes may be a cause of frozen shoulder but does not support the hypothesis that the effect is mediated by metabolic health. [20] ([10.1186/s12891-025-08672-2](#))
- [L4] Clinicians should consider this diagnosis in diabetic patients with atraumatic acute-onset pain and swelling in the hand to avoid confusion with other inflammatory, infectious, or vascular conditions. [21] ([10.1016/j.jhsg.2021.10.006](#))
- [L4] Percutaneous release with or without simultaneous corticosteroid injection has shown promising results and is equally effective and safe in diabetics and nondiabetics. [23] ([10.1016/j.jhsa.2018.03.045](#))
- [L3] Additionally, it is a safe and well-tolerated method for AC management for diabetic patients. [24] ([10.5397/cise.2021.00381](#))
- [L4] This procedure is a safe and effective treatment for the often-difficult problem of stenosing flexor tenosynovitis in the diabetic patient. [25] ([10.1007/s11552-007-9065-z](#))
- [L2] These glycemic changes are short-lived, mostly limited to the 2-3 days after the injection, and none of the patients required any change in antidiabetic treatment. [26] ([10.1016/j.jseint.2022.05.016](#))
- [L3] When shoulder mobilization was achievable with gentle manipulation under anesthesia, the outcome was satisfactory in both patients with IDDM and those with NIDDM. [27] ([10.1067/mse.2002.127301](#))

- [L4] However, diabetic patients are reported to have more residual pain, reduced motion and inferior function compared to idiopathic cases. [28] ([10.1016/j.otsr.2019.02.014](https://doi.org/10.1016/j.otsr.2019.02.014))
- [L1] Diabetes is a likely causal risk factor for frozen shoulder, likely through a pathway involving long-term high blood glucose levels. [30] ([10.1371/journal.pgen.1009577](https://doi.org/10.1371/journal.pgen.1009577))
- [L4] The moderate correlations between upper and lower extremity range of motion, strength, and function suggest a concurrent development of musculoskeletal complications in people with DM. [31] ([10.1016/j.foot.2020.101680](https://doi.org/10.1016/j.foot.2020.101680))
- [L3] Type 2 diabetes does not seem to be a risk factor for carpal tunnel syndrome. [32] ([10.1186/1471-2474-15-346](https://doi.org/10.1186/1471-2474-15-346))
- [L2] Among patients with diabetes who had CTS, higher RAGE expression was observed in those with more severe disease, suggesting that RAGE-mediated pathways may play a role in the pathophysiology of CTS in patients with diabetes. [33] ([10.1097/corr.0000000000003800](https://doi.org/10.1097/corr.0000000000003800))
- [L4] It therefore provides a potential molecular and pathological basis for the predisposition of diabetic patients to the development of CTS. [34] ([10.1007/s00125-014-3271-3](https://doi.org/10.1007/s00125-014-3271-3))
- [L5] Whole-transcriptome expression profiles demonstrate a fundamentally different underlying pathophysiology when comparing diabetic AC with idiopathic AC, suggesting that these conditions are distinct clinical entities. [35] ([10.1016/j.jse.2021.06.016](https://doi.org/10.1016/j.jse.2021.06.016))
- [L2] Long-term improvement in patients with diabetes remained after carpal tunnel release to the same extent as for patients without diabetes. [36] ([10.1016/j.jhsa.2014.01.012](https://doi.org/10.1016/j.jhsa.2014.01.012))
- [L4] In the present study, musculoskeletal hand disorders were prevalent in T2DM patients in Jordan. [37] ([10.1111/1756-185x.12617](https://doi.org/10.1111/1756-185x.12617))
- [L3] Patients with diabetes experience more symptoms both before and after open carpal tunnel release, but can expect the same relative improvement from surgery as patients without diabetes. [38] ([10.1136/bmjopen-2019-030179](https://doi.org/10.1136/bmjopen-2019-030179))
- [L4] Analysis of the authors' clinical series demonstrates that more than one third of the patients are diabetic. [39] ([10.1016/s0749-0712\(21\)00424-8](https://doi.org/10.1016/s0749-0712(21)00424-8))

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