· 综述 ·

跑步相关骨关节炎的发生与机制

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跑步是一种常见的负重运动,深受广大人民群众喜好。规律的跑步运动不仅有利于身、心健康,还能减少糖尿病、心血管疾病等慢性疾病的发生。然而,跑步是否与下肢负重关节(特别是膝关节)的骨关节炎(osteoarthritis,OA)的发生存在相关性令人关注[1-2]。了解跑步相关 OA 的发生及相关机制,对于预防疾病的发生以及安全有效地进行跑步运动,都具有十分重要的意义。

跑步与发生 OA 危险的相关性

不少流行病学研究探讨了跑步与 OA 发生之间的相关性,其中有些学者[3-8]认为,跑步可能会增加发生 OA 的危险性,而另一些学者[2,9-11]却否认这种相关性。研究结果的不一致性至少部分是这些研究在方法学上的缺陷所致[12],包括缺乏对照组[7]、样本量很小[2,7-8]、跑步者和非跑步者没有随机分配[2,10-11]、OA 的诊断标准不统一[3-4,11]以及在区分是跑步效应还是损伤所致方面的困难[3,5]。因此,今后需要更严谨设计的研究以更好地明确两者的相关性。

尽管存在一些缺陷,但现有的研究还是可以得出下列初步的结论:①不支持中-低强度,或者休闲跑步与 OA 发生之间存在相关性[1-2];②跑步导致 OA 发生危险性增加与一些因素有关,包括跑步强度[3-5,13]、年龄[3,10]、受伤史[5-8]、肥胖[9-10]等。

适量跑步对正常关节健康的影响

一般来说,规律跑步有利于全身和肌肉骨骼系统的健康。与非跑步者相比,跑步者有着较好的功能容量(functional capacity)及较少的身体残疾[14],而且流行病学研究也证实,适量跑步并不增加正常关节发生 OA 的危险性[1-2]。一些研究采用磁共振(magnetic resonance imaging,MRI)技术探讨跑步对关节健康的影响,如 Krampla 等[15]对 8 例业余长跑爱好者参加马拉松赛前、赛后即刻及赛后 6~8 周行膝关节 MRI 检查,结果显示赛前没有异常发现的参赛者,赛后也没有异常表现;这一研究小组[16]进一步对其中 7 例进行了长达 10 年的随访,发现除 1 例 10 年前就存在关节炎的跑步者出现放射性进展外,其他跑步者并无明显放射性改变。类似的研究也证实,长跑并不导致骨髓腔肿胀或关节积液[17]。这些 MRI 研究说明,跑步对正常关节不仅没有有害作用,甚至有保护作用。

理论上讲,跑步有利于正常关节的健康:①跑步可增加关节周围肌肉的力量,有助于负重时分散下肢关节面的压力,减少关节损失的危险;②跑步提高软组织伸展性、血流量和关节液的流动,有利于维持关节活动范围和提供软骨基质必要的营养[18];③跑步可直接促进体重减轻,并减缓中年人的体重获得增加(weight gain)[19]。控制体重会减少膝关节发生 OA 的危险性,而预防体重增加也会限制 OA 发生的危险性[10]。

跑步与关节健康关系的调节因素

尽管休闲跑步被认为并不导致下肢关节 OA 发生危险性的增加,然而不少研究证实,在下列情况下,跑步与发生 OA 的危险性增加相关[3-10,13]。

一、高水平或者竞技跑步

一些针对退役的优秀中、长跑运动员研究指出,跑步与发生 OA 危险性存在相关性[10-15]。有学者还发现,男性跑步爱好者中,高水平跑步爱好者的 OA 发病率显著高于中、低水平者[16]。一方面,高水平跑步可导致下肢负重关节过高的载荷,如果载荷大小超过其所能承受的生理水平,就会对关节有害。其次,高水平跑步可能与关节损伤率增高相关[20],进而增加 OA 发生的危险性(详见后述)。再次,优秀跑步运动员因为痛觉阈值较高[21]或者下肢肌肉疲劳可引起载荷感受和肌肉反应之间微妙同步的受损,因而增加 OA 发生的危险性[22]。

二、年老

无论是休闲跑步者[6],还是退役优秀跑步运动员[10],下肢关节发生 OA 的危险性均随着年龄增大而增加。老年人跑步时股骨和胫骨关节软骨的形变会变小[23],提示关节软骨胶原纤维更容易发生疲劳破坏[24]。此外,动力学和地面反应力的研究还发现,老年人跑步时下肢关节的缓冲能力相对较差[25]。

三、关节损伤

跑步者膝 OA 发病率增高被证实与膝损伤的高发病率密切相关[13-15]。关节损伤史被认为是跑步与 OA 发生之间关系的一个重要调节因素,它会引起继发性肌肉无力、关节不对称、力学对线不良、关节不稳以及神经性缺损等改变[26]。异常的载荷模式与受损的肌肉功能会导致关节软骨退行性改变[27]。

四、关节对线不良

有流行病学研究报道跑步者膝 OA 较高的发生率与膝内翻之间存在相关性[15]。与具有正常关节力学特征和神经肌肉功能的人群相比,关节对线不良者跑步时局部软骨的接触应力会显著增加,进而导致软骨的退行性改变[28-29]。

五、肥胖

身体质量指数(body mass index,BMI)被认为能调节跑步与 OA 危险性之间的相关性[6,30]。肥胖意味着下肢关节更大的载荷,更大的体重意味着下肢肌肉必须具有更大的肌力和耐力,以吸收更多的载荷。不幸的是,肥胖者常常缺少活动,伴有相对的肌肉功能失调(relative muscle dysfunction)[31]。这种相对肌肉功能失调可导致肥胖/超重跑步者 OA 发生的高危险性[32]。

DOI:10.3760/cma.j.issn.0254-1424.2016.11.021

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跑步相关 OA 发生的机制

尽管很多的研究关注跑步与 OA 发生危险性之间的关系，跑步相关 OA 发生的原因并不清楚。长期以来，OA 被认为是一种由于“磨损（wear and tear）”导致软骨缺损的疾病，因而“磨损”被认为是运动相关 OA 发生的主要原因[33]。根据这一假设，任何类型的碰击活动，包含跑步，都会增加 OA 发生的危险性，或一旦 OA 发生后会进一步恶化。然而，最新的观点认为：OA 并不是一个单纯的软骨病变，应是涉及诸多组织的全关节病理性改变[34]。更重要的是，流行病学证据显示休闲跑步并不增加 OA 危险性，甚至是有益于软骨健康[2,9]。

关节周围肌肉疲劳会导致跨关节撞击力的增加[35-36]，说明合适收缩的肌肉是撞击力的主要吸收器。正是基于这一发现，Hurley 在回顾了大量基础研究证据后（尽管大多是间接证据），提出了肌肉的运动与感觉功能失调是原发性 OA 最主要的、且可改变的调节因素[37]。Shrier 在总结了大量关于体育活动与髋/膝 OA 相关性的文献报道后，支持肌肉功能失调是运动相关 OA 主要原因的观点[32]。然而，并没有直接的证据来支持或反对二者之间的因果关系。更重要的是，除了肌肉，很多其他的组织，如肌腱、韧带、关节囊、力学感受器等，都在日常活动中保护软骨免受损伤。OA 常常缓慢发生，不是一个（软骨）而是几个关节保护器受损所致。OA 是一个多因素的疾病，单一的机制可能并不能全面解释跑步相关 OA 所涉及的、这种复杂的力学与肌肉神经因素的相互作用[18]。

OA 发生的危险因素很多，包含全身和局部因素。Felson[38] 将这些危险因素分为二类：一类因素增加关节易损性（vulnerability），如关节对线不良、肌肉无力、年老、遗传因素等；另一类是增加关节载荷，包括肥胖、某些类型的体育活动等。为此，跑步相关 OA 的发生很可能是关节易损性和关节载荷共同作用的结果。如前所述，与跑步相关 OA 发生相关的因素主要包括导致关节易损性增高（如年龄增加、关节受伤史、关节对线不良等）和关节载荷增加（如肥胖、高水平跑步等）的因素。因此，对正常关节，适当强度的载荷并不可能导致跑步相关 OA 的发生。然而，取决于关节易损性的程度，适量的载荷（休闲性跑步和/或正常体重）也可能有使易伤关节发生 OA 的危险。另一方面，过量的载荷（竞技性跑步和/或超重）也可能增加正常关节发生 OA 的危险。

结语

综上所述，目前尚不清楚跑步与 OA 发生危险性的关系，今后需要设计更严谨的研究，包括参与者的选择、更客观准确的检测方法、定量的跑步方案等。尽管如此，可以初步认为，适量的跑步对正常关节没有负面的影响，可以列出和探讨导致跑步者关节 OA 发生危险性增高的因素。今后还需要进一步的研究以明确这些因素与 OA 发生的直接因果关系，以及探讨其他的相关因素。相关因素的确定，可明确危险人群，提高危机意识。更重要的是，为了安全跑步，需针对这些因素采取措施和/或改变跑步方案。

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(修回日期:2016-10-10)

(本文编辑:汪　玲)

·外刊撷英·

Cognitive and physical rest after concussion

BACKGROUND AND OBJECTIVE The Fourth Internationsl Concunsus Ststsm6nt on Concussion in Sport suggested that cognitive and physical rest are important for treatment during acute concussion. while clinical expertise supports this rest period, the external clinical evidence is limited and largely derived from animal research. This study evaluated the effectiveness of cognitive and physical rest on the traditional concussion recovery metrics among colleg-age studentathletes with concussion.

METHODS Participants were drawn from a prospective study on concussion management. As part of a revised concussion management protocol, all student-athletes diagnosed with concussion were withheld from all activities for the remainder of the day and were provided one additional day of cognitive and physical rest. Outcomes of these individuals were compared with those of 25. consecutive students treated in the two academic years prior to this policy change, who had not had their sctivities festficted.

RESULTS All subjects were assessed with a graded symptom checklist, immediate Post-Concussion Assessment Cognitive Testing (ImPACT), the Balance Error Scoring System (BESS) and the Standard Assessment of Concussion (SAC) test. Both groups were withheld from team-related physical activity until they self-reported being asymptomatic and achieved baseline values on the clinical battery of tests.

CONCLUSION The rest group was symptomatic for5.2days and the no rest group for 3.9 days ($P=0.047$). There was no significant difference between the two groups in time to return to baseline as assessed with the BESS, the SAC and computerized neuropsychological testing, or the time to clinical recovery.

CONCLUSION This study of college students with concussions found that those given a day of rest atter concussion had significantly longer time to recovery from symptoms, than did those without such a period of rest, with no difference in time to clinical recovery.

【摘自:Buckley TA, Munkasy BA, Clouse BP. Acute cognitive and physical rest may not improve concussion recovery time. J Head Trauma Rehabil, 2016, 31(4):233-41.】